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ENDANGERED SPECIES

Technical Bulletin

U.S. Department of the Interior
Fish and Wildlife Service

Improved Status Leads to Reclassification Proposals for Two Plant Species

The status of two plant species currently listed as Endangered has improved enough that the Fish and Wildlife Service (FWS) recently proposed to reclassify them to the less critical category of Threatened:

Small Whorled Pogonia *(Isotria medeoloides)*

A small green orchid, this species is distinguished by the five or six leaves displayed in a whorl with a yellowish-green flower in the center. It grows in fairly young forests and in maturing stands of mixed-deciduous or mixed-deciduous/coniferous forests. Populations of the small whorled pogonia occur at sites from southern Maine through the Atlantic seaboard States to northern Georgia and southeastern Tennessee. Outlying colonies have been found in the western half of Pennsylvania, Ohio, Michigan, Illinois, and Ontario, Canada.

Concerns about habitat loss led to the listing of this species as Endangered in 1982. Among the recommendations contained in the 1985 Small Whorled Pogonia Recovery Plan were searches for additional populations, protection for a sufficient number of sites, and research into the plant's life history. Since 1985, botanists have located additional populations and sought to protect a number of sites. About 60 percent of the viable sites are now secure. Many of the protected populations are on public lands, though the voluntary cooperation of private landowners and conservation organizations continues to be vital to the recovery of the small whorled pogonia. Management will benefit from the increased knowledge of the species' habitat needs.

On November 29, 1993, in accordance with criteria in the 1992 revised recovery plan, the FWS proposed to reclassify the small whorled pogonia as Threatened. Although the species is no longer believed to be in imminent danger of extinction, complete delisting is not appropriate until additional sites are protected.

photo by Susanna von Oettingen

Habitat protection and landowner cooperation have helped improve the status of this woodland orchid, the small whorled pogonia.

Loch Lomond Coyote Thistle *(Eryngium constancei)*

Despite its common name, this plant is not a thistle but a perennial herb in the parsley family (Apiaceae). It occurs only on the floor of Loch Lomond, a vernal lake in California. Vernal lakes and pools are an unusual habitat type forming in areas with Mediterranean climates where slight depressions underlain with an impervious soil layer fill with water after fall and winter rains. These seasonal wetlands then dry slowly during the spring and summer. The cyclic wetting and drying create an unusual ecological situation supporting a unique biota. Many plants and animals are adapted specifically to this environment and cannot survive outside the temporary pools.

In 1985, after the lake bed was partially dredged and filled, and plans were made to fill the rest, the FWS listed the Loch Lomond coyote-thistle as Endangered. At the time, the plant's habitat was also threatened by off-road vehicles, hikers, highway maintenance, and trash dumping. Subsequently, the State of California purchased the lake and, with FWS assistance, installed a split-rail fence. Both of these actions greatly reduced the potential for disturbance of the lake floor.

Because the species is now believed to be more secure, the FWS proposed November 29 to reclassify the Loch Lomond coyote-thistle as Threatened. Complete delisting is not believed appropriate at this time due to occasional vandalism, the

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Regional News

Regional endangered species staffs have provided the following news:

Region 2 - Five parent-reared whooping cranes *(Grus americana)* are in quarantine in preparation for shipment and release in the Kissimmee Prairie of Florida, the site of 5 surviving cranes released in February 1993. (See *Bulletin Vol. XVII, No. 9-11.*) Two whooping cranes from the International Crane Foundation in Baraboo, Wisconsin, and 3 from the Fish and Wildlife Service's (FWS) Patuxent Wildlife Research Center in Laurel, Maryland, will join the 5 survivors in this effort to establish a nonmigratory flock in central Florida. Later this winter, biologists plan to release 14 "isolation-reared" young whooping cranes from Patuxent. The new arrivals are expected to join the experienced birds and learn survival techniques from them.

* * *

By December 20, 143 cranes, including 16 chicks, had reached their wintering grounds at Aransas National Wildlife Refuge on the Texas coast. This number is about the total anticipated to arrive. Biologists were unable to find six pairs that had a single chick each during surveys conducted in June at the species' breeding grounds in Wood Buffalo National Park, Northwest Territories, Canada.

* * *

The Captive Breeding Specialist Group of the International Union for the Conservation of Nature has published *A Whooping Crane Conservation Viability Assessment*, edited by Claire Mirande, Robert Lacy, and Ulysses Seal. Accomplished under contract with the FWS, the report includes priorities for research and management of wild and captive populations to maximize retention of genetic heterozygosity and minimize the risk of extinction. Estimates are that about 87 percent of the genetic diversity has survived since the population bottleneck of the 1940's.

If the annual 4.6 percent population growth of the last 50 years continues, the wild population at Aransas National Wildlife Refuge will reach 500 birds by about the year 2020. Biologists predict a very low probability of extinction (less than 1 percent) during the next 100 years. The whooping crane has the highest long-term recruitment rate—13.9 percent—of any North American crane population.

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Secretary Babbitt Addresses the Impact of Endangered Species Protection on Private Landowners

by Ken Burton

There is little evidence to support claims that the Endangered Species Act has worked widespread hardship on landowners, Interior Secretary Bruce Babbitt told the conference of the Society of Environmental Journalists at Duke University in October.

"Instead of attacking the law directly, the opponents have assembled under the banner of the Wise Use movement and concocted a new and radical concept," Babbitt said, "that any government action affecting the value of a property right automatically creates a right to compensation from the United States Treasury."

Babbitt said environmental regulations are no different in concept than planning and zoning regulations imposed across the United States virtually every day to serve various public purposes.

"And in fact, upon close examination, many planning and zoning regulations are environmental regulations — providing open space, preserving stream courses, limiting congestion and air pollution, and generally providing a more liveable environment," Babbitt said.

Babbitt noted that his hometown of Flagstaff, Arizona, has a city ordinance prohibiting property owners from cutting ponderosa pine on their land except as necessary to make space for improvements authorized by the planning and building codes. "The purpose of the ordinance is to preserve the magnificent, pine-scented landscape that enhances the value of all property, even as it limits the freedom of any individual landowner to cut down all the pine trees on his property for no reason at all," the Secretary said.

"To hear the opponents of the Endangered Species Act," said the Secretary, "habitat conservation provisions have somehow worked widespread hardship on landowners. Yet the fact is that there is little evidence supporting that claim."

For the 20 years the Endangered Species Act has been in place, and "despite the fact that more than 800 species throughout the U.S. are now protected by it," Babbitt said, not a single instance has occurred in which a landowner was so affected by the Act that he was awarded compensation for a governmental "taking" of his property through the claims court.

"Of course, the fact that, in 20 years, the Fish and Wildlife Service has never come close to a constitutional taking does not end the matter," Babbitt said. "I believe the government has a higher obligation to its citizens than simply staying out of court and away from a constitutionally protected taking. Government has an obligation to treat all citizens reasonably, to minimize the inconvenience, to apply regulations in the least instrusive and most thoughtful way."

The Secretary listed several approaches:

- The Department should use, whenever possible, public lands for the habitat necessary to protect an endangered species.
- Mitigation fees: a habitat conservation plan worked out with the City of Las Vegas provides that residential developers pay a mitigation fee which in turn goes into a fund to pay for conservation measures on lands used as tortoise reserves. "In concept," Babbitt said, "this mitigation fee is no different from a lot assessment to finance water, sewage or playgrounds."
- Sometimes, "a few thoughtful, constructive changes in our approach to land management will suffice," such as the Georgia Pacific Company's plan designed to protect the red cockaded woodpecker.
- In cases where a reasonable habitat conservation plan cannot be worked out, it may be appropriate to consider land exchanges or even outright purchase from willing sellers, Babbitt said.

Babbitt said he recognized that in some cases, delays have caused hardship

to some small landowners caught in the regulatory freeze. "It is these cases that one hears about in the press, and I am frankly very sympathetic to such complaints. At my direction, the Fish and Wildlife Service is beginning a review of this issue and is seeking improved methods... to provide more flexibility in responding to the needs of individual small landowners in the use and improvement of their property," Babbitt said.

"The Endangered Species Act is working. The well publicized 'train wrecks' that we read so much about illustrate, in most every case, not deficiencies in the Act, but the willful failure of public officials to explore and use the flexible provisions of the Act that are available to protect the incomparable biodiversity of the American landscape and to accommodate the reasonable use and development expectations of landowners," Babbitt said.

Ken Burton, a public affairs specialist with the Fish and Wildlife Service, attended the October meeting. The organization Secretary Babbitt addressed, the Society of Environmental Journalists, was formed several years ago to promote professionalism in the reporting of environmental affairs. It has a membership of about 900 print, radio, and television journalists, as well as members in related fields in government and the private sector.

Taiwan and Peoples Republic of China are Warned Against Continued Trade in Rhino Horn and Tiger Parts

by Denise Henne

Pursuant to the Pelly Amendment to the Fisherman's Protective Act of 1967, Secretary Babbitt certified to President Clinton on September 7, 1993, that Taiwan and the People's Republic of China are engaging in trade of rhinoceros and tiger parts and products, thereby threatening these animals with extinction. This certification states that the trade also diminishes the effectiveness of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), an agreement among 120 countries to prohibit trade in endangered wildlife species.

On November 8, in response to the Pelly certification, the President notified Congress that unless China and Taiwan demonstrate measurable, verifiable, and substantial progress in eliminating the trade by March 1994, the United States may impose import prohibitions against them as recommended by CITES.

Rhinoceros numbers have declined 90 percent within the last 23 years to the current level of fewer than 10,000 animals worldwide, and the tiger population has fallen 95 percent during this century to about 5,000. It is believed that wild populations of these animals may become extinct within 2 to 5 years if the trade in their parts and products, which includes rhinoceros horn and tiger bones, is not immediately eliminated. Although recent actions by Taiwan and the People's Republic of China indicate that some progress has been made in addressing their rhinoceros and tiger trade, neither government has fully implemented the international standards established by CITES for controlling the trade in these critically endangered species. Rhinoceros horn and tiger bone are used extensively in traditional Asian medicines.

photo by Dusty Wissmath, African Wildlife Foundation

According to the World Wildlife Fund, the number of black rhinos* (Diceros bicornis) *in Africa has plummeted from 65,000 in 1970 to fewer than 2,000 today, which would mean this species is declining faster than any other large land mammal in recent times.

photo © Environmental Investigation Agency, World Society for the Protection of Animals

This rhinoceros horn offered for sale in Hong Kong was photographed by hidden camera.

The Secretary made his announcement of the Pelly certification in Brussels, Belgium, where he attended the meeting of the CITES Standing Committee with Fish and Wildlife Service (FWS) staff. The Standing Committee acts on behalf of the CITES Parties between the biennial Conference of Parties. After the Secretary's announcement, the Standing Committee unanimously recommended that CITES parties consider implementing "stricter domestic measures up to and including prohibition in trade in wildlife species" against China and Taiwan for their trade in tiger and rhinoceros parts and products.

In his November 8 message to Congress, the President noted the good faith efforts made recently by China and Taiwan, but he added that these efforts have yet to effectively reduce the rhinoceros and tiger trade. Actions that would demonstrate China's and Taiwan's commitment to eliminating the trade in parts and products of these animals could include, at a minimum, (1) consolidation and control of stockpiles; (2) formation of a permanent wildlife conservation law enforcement unit with specialized train-

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In the Eye of the Beholder: Our Image of the African Elephant

by Holly Dublin

photo by Sven-Olof Lindblad, African Wildlife Foundation

No species of bird or mammal, extant or extinct, has elicited more human emotion than the African elephant *(Loxodonta africana)*. In a world where most species are still unknown to the average person, something about this enormous but seemingly dignified pachyderm evokes a vast array of feelings. The African elephant is characterized by the most extreme of attitudes, and these extremes often follow the classic "north/south" split. But there are reasons, good reasons, for the gamut of opinions surrounding the species.

It is a common mistake for people living in the northern hemisphere to believe that everyone everywhere finds the same mystique in elephants. People whose entire exposure comes through television screens associate serenity and kinship with elephants. Given the enormous publicity surrounding the species over the past 5 years, it is no wonder the animal has become the "sweetheart" of the north. Without a doubt, the African elephant possesses many admirable traits. These characteristics have never been brought to our attention more articulately and poignantly than through the writings and films of Cynthia Moss and Iain Douglas-Hamilton, both of whom have shared significant portions of their lives with elephants. These days, by simply taking the time to watch documentary television, even the average American can feel a connection with the species.

However, we must never lull ourselves into believing that all people feel the same empathy for elephants. Many neither revere elephants nor even care for them. Some people, in fact, fear and despise them. This is primarily the case for those who have to share their daily lives and often, involuntarily, their livelihoods with elephants. These individuals do not live among the elephants by choice but rather by circumstance. Today, in a growing proportion of the African elephant's range, people and elephants are coming into conflict—a conflict brought about by the very nature of their codependence on the land and the resources sustaining them.

For a decade or more, the killing of African elephants by humans dominated our thoughts, but today the tables are turning. In many parts of Africa, attention is being drawn to the increasing destruction brought about by elephants. While the initial recovery of several elephant populations from years of unsustainable and illegal take is often viewed as a conservation success, it is only one part of a much bigger and more complex story that may spell the eventual decline of the species. While people and elephants share many of the more endearing traits of social mammals, their competition for declining land space fuels problems for both species. There is a "land hunger" in Africa, and both humans and elephants are the victims.

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In the Eye of the Beholder

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As Africa's human population continues to grow, elephants will increasingly become limited to strictly protected areas. Their future will depend, in most cases, on their ability to survive in these restricted habitats and, to a lesser extent, to coexist in other areas with human populations wherever possible. The increasing confinement of elephants in areas set aside primarily to protect other wildlife and natural attributes presents yet another challenge: how can a loss in biodiversity be avoided as elephants fulfill their role as architects and agents of large-scale vegetation change?

The challenge is to chart a strategy that guarantees the survival of elephants while meeting the needs of people who inhabit the same region. Developing and implementing this strategy will neither be simple nor without controversy. One school of thought is that we must "use" elephants or "lose" them. Use in this case means the legal take of elephants, and the sale of their ivory, on a sustainable basis. This view is primarily associated with people who share their homelands with elephants and stand to profit directly from the sale or consumption of elephant products. Not surprisingly, this ideology is an anathema to many conservationists enjoying evenings with elephants by watching them on public television. There are also people with intermediate views that accept and promote limited use of the species through such activities as trophy hunting. So where does the solution lie?

There is an undeniable inequity in our world as it relates to elephants. The people who literally have to live with elephants are rarely seen or heard by an audience broader than the local wildlife management authorities mandated with solving their elephant-related problems. Those who "live among the elephants" vicariously, through books or television screens, have significant influence. There is a need to hear and address the concerns of both groups of people.

We have learned that the task of saving elephants is not a simple one. Although many had hoped the ban on the international sale of ivory and elephant products, effective January 1990, would ensure the conservation of African elephants, this has proven to be an oversimplified solution to a complex problem. As reports of illegal killing are on the increase again in many elephant range states in Africa, we must expand our horizon and look for longer-term solutions that encompass the complexity of issues confronting both elephants and humans.

These solutions will not be easy to find, as experience has shown. The most difficult task will be to reach a consensus on how to manage African elephants. Unfortunately, however, consensus is difficult to achieve. We must start small and move toward higher and higher levels of cooperation and collaboration. From now on, we must begin to hear one another's viewpoints and respect them. There has been far too much talking and not enough listening.

The reconstruction of the African Elephant Specialist Group (AESG), part of IUCN—The World Conservation Union, has provided at least the rudimentary beginnings of a forum for both giving and receiving technical information. The focus of the AESG is on prioritizing conservation issues facing the species and formulating technically sound ideas. Implicit in this approach has been an honest attempt to reconcile past differences between experts in elephant range states and those in other regions through open dialogue, with the freedom to agree or disagree on the basis of technical, rather than emotional, grounds.

The AESG has been assisted in its auspicious new mission by generous and timely funding from the U.S. Fish and Wildlife Service, the World Wide Fund for Nature (WWF), the European Community, and the government of Germany. This assistance enabled the AESG to hold a very productive meeting in Zimbabwe in late 1992. The meeting focused on the more technical aspects of the interaction between elephants and habitats, current elephant survey techniques, and future data needs for the conservation and management of elephants in Africa. At the next meeting, the AESG will address human/elephant conflicts, update information on elephant status and distribution, and debate any explicit technical matters that require consultation. In doing so, the AESG will lay the groundwork for further actions that may take place at the next Conference of Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which will be held in November 1994. Additionally, the AESG office in Nairobi, Kenya, has become a central repository for books, articles and current ideas; a think-tank for the review and generation of research proposals on key topics; the creative center for the compilation of AESG's newsletter, *Pachyderm;* and a meeting place for people who share an interest and concern in the fate of the African elephant.

The target is still moving, and there are many obstacles to be tackled. All solutions have a beginning, and we can only hope that—given productive dialogue and a willingness to hear one another—we are standing at the threshold of understanding the way forward. This truly magnificent species deserves our time, our concern, and our continued efforts on its behalf.

Dr. Dublin is the Co-chair of IUCN's African Elephant Specialist Group.

The opinions expressed by Ms. Dublin are not necessarily those of the Fish and Wildlife Service. Her article is part of an effort by the Bulletin to explore some of today's more challenging wildlife conservation issues by soliciting material representing independent viewpoints. If you would like to contribute by proposing an article, write the Editor, Endangered Species Technical Bulletin, U.S. Fish and Wildlife Service, 320 ARLSQ, Washington, D.C. 20240, or call 703/358-2166. See Bulletin Vol. XVIII, No. 4, for style guidelines.

Partnership for Pachyderms

by Mary Maruca

What do elephants and architecture have in common? If you answered with the word "keystone," you're right. The keystone — a wedge-shaped piece at the crown of an arch that holds the other pieces in place — has become an apt metaphor for elephant conservation. In an era increasingly concerned about the complex interrelationships shaping the natural environment, the elephant is conspicuous for its ability to terraform the landscape through which it moves, converting woodlands to grasslands, dispersing seeds, and creating waterholes. Innumerable species depend on the continuance of the elephant's biological patterns for the maintenance of habitat. They thrive in the elephant's shadow, so to speak.

However, the African elephant's ability to function as a keystone species became severely threatened during the decade of the 1980's. Wide-spread illegal ivory trade decimated populations. From an estimated 1.2 million, numbers dropped to fewer than 600,000. As the legislative body of the world's third largest consumer of ivory products, the United States Congress responded to this decline in 1988 by enacting the African Elephant Conservation Act, supporting the conservation programs of African countries and upholding CITES. In so doing, the Congress chose the quintessential animal through which to address biodiversity, creating keystone legislation for a keystone species.

Integral to the effectiveness of the African Elephant Conservation Act was the African Elephant Conservation Fund, established by the Act as a funding source to assist range countries with their elephant conservation priorities. Administrated by the Fish and Wildlife Service, through the Department of the Interior, a grant program supported by the Fund has proven to be an easily mobilized, on-the-ground operation capable of responding quickly to immediate needs. For relatively small sums of money, the program has enabled range countries to implement their highest priority projects aimed at maintaining the critical role of elephants as a keystone species.

Since its initial funding in 1990, the grant program has supported 33 projects in 11 of the 34 range countries with African elephant populations. Key criteria consistent throughout the program's several years of operation have helped identify viable projects and contributed to success. First, the host country must have demonstrated commitment to elephant conservation, expressed through (1) its establishment of local elephant management programs, (2) the dedication of its own economic resources, within budgetary constraints, to elephant conservation, and (3) its availability as a participant in elephant projects.

Photo by Linblad/African Wildlife Foundation

Secondly, to qualify for funding, projects must fit within the parameters established by a range country's elephant conservation plan. Early on, the Fund recognized the context this could provide for project planning, and dedicated resources to assist range countries wishing to develop such plans. All countries within the current range of African elephants have plans in place. This effort has given elephant conservation visibility at the highest levels of government, helped establish national priorities, and provided target goals against which individual projects can be evaluated.

It has also enabled the grant program to work in partnership with range countries, responding to their own priorities rather than intervening to set priorities for them. From the start, the intent of the program has been not to dictate conservation priorities, but to work within the priorities already established by host countries meeting African Elephant Conservation Act criteria. Elephant conservation plans have helped this to occur effectively. Also, the availability of the plans to other bilateral donors has made it possible for those interested in elephant conservation to become familiar with specific projects and coordinate assistance.

Third, the Fund's capability to generate contributions from the private sector, other governments, non-government organizations, and the host country remains one of its greatest assets. Money donated from various sources is pooled to improve opportunities for key elephant populations. More than $2 million have been generated as matching funds. Although there is not enough money to fund every project, the program attempts to balance the needs of elephant conservation throughout the species' range. With partners, the Fund cooperates on projects from Senegal in the west to Tanzania in the east and Namibia in the south.

Recognizing that conservation needs expressed in elephant conservation plans

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Partnership for Pachyderms

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far exceed available funding, the grant program has sought to supply the operational needs of projects capable of continuing their work once set-up funds have been provided. This has translated into financial support for anti-poaching activities and status surveys requested by range countries. Recently, however, as elephant populations have begun to stabilize, the focus has shifted somewhat — from requests to fund anti-poaching efforts to projects addressing human/elephant conflicts as elephants begin to return to parts of their former range. One priority for the current allocation is the selection of projects that concentrate on elephant conservation while benefiting rhinoceros populations. Once again, inherent in this effort is recognition of the elephant's role as a keystone species upon which the well-being of other species depends.

Perhaps one of the most complicated and most innovative projects funded by the program to date has involved the translocation of an estimated 1,000 elephants in Zimbabwe. During the drought of 1991-1992, the government of Zimbabwe determined that elephant population levels in Gonarezhou National Park exceeded the carrying capacity and, if left unmanaged, could lead not only to species decline in that area but also to significant habitat loss. The demise of local sheep and cattle during the drought provided the Zimbabwean wildlife department with an opportunity to negotiate with ranchers for the benefit of native species. The result was agreement to work cooperatively, creating tracts of open rangeland to meet the needs of translocated elephants and other species.

Once again, the grant program responded in conjunction with other matching funding sources, doubling the benefits to the species. The grant covered such essentials as helicopters and other equipment needed to herd and tranquilize the animals. The ranchers receiving the animals provided transport costs.

The successful Zimbabwean translocation effort holds promise as an management approach to herd reduction when numbers exceed an area's normal carrying capacity, and may serve as a model for other countries within the species' range. It also leaves open the possibility that populations on the decline in some countries feasibly may be restocked with translocated groups. Although not all the results are in, this creative use of funding not only has made the future brighter for the Gonarezhou elephants but also for the other species that depend on them.

All in all, the African Elephant Conservation Fund has become an important vehicle through which money for the conservation of a keystone species reaches on-the-ground projects that take into account not simply the elephant but also the complex environment it shapes. The grant program is proving to be an effective partnership, one acknowledging Aldo Leopold's injunction that "the first precaution of intelligent tinkering" is keeping all the pieces — especially when one of the major piece happens to be elephants.

Mammoth or Elephant Ivory? Forensics Provides the Key

by Edgard O'Niel Espinoza and Mary-Jacque Mann

Due to threats posed by habitat loss and overexploitation, importation of African elephant (*Loxodonta africana*) ivory was prohibited in 1989. Imports of ivory from Asian elephants (*Elephas maximus*) had already been banned for similar reasons. Immediately after the 1989 ban took effect, U.S. ports began receiving large shipments of carved "mammoth" or "mastodon" ivory instead of the usual African elephant ivory.

Although U.S. Fish and Wildlife Service (FWS) wildlife inspectors at ports of entry strongly suspected that these shipments were actually illegal elephant ivory, there was no analytical technique available to test the importers' claims. The FWS Division of Law Enforcement therefore requested the assistance of the newly established Clark R. Bavin National Fish and Wildlife Forensics Laboratory in Ashland, Oregon. Scientists at the facility were asked to develop a reliable, non-destructive method to differentiate the ivories of mammoths and modern elephants.

Mastodons, mammoths, and modern elephants are all members of the Proboscidea order of mammals. Mammoths lived during the Pleistocene Epoch and have been extinct for approximately 8,000 to 10,000 years. Mastodons coexisted with mammoths for part of the Pleistocene, occupying a different niche before becoming extinct themselves. Although there were several species of mammoth, the "woolly" or "hairy" mammoth (*Mammuthus primigenius*) from the Alaskan and Siberian tundras is the only known source of commercially significant extinct proboscidean ivory. Despite occasional claims that mastodons have contributed to the ivory trade, mastodon ivory has not survived the millennia with enough preservation for commercial uses.

The woolly mammoth roamed Siberia and other parts of northern Asia, Europe, and North America. Early humans probably pursued the mammoth and other game across the Bering land bridge to the new world. Published descriptions of frozen mammoth carcasses found in Siberia date back to the eighteenth century. These frozen remains portray a powerful animal about 12 feet in height weighing up to 15,000 pounds (slightly larger than an African bull elephant), bearing deeply curved tusks that measured as much as 16 feet in length. The wooly mammoth

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Mammoth or Elephant Ivory?

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was well protected from its frigid tundra environment by extra fat reserves and two thick layers of hair.

Woolly mammoth ivory has been in significant commercial demand for centuries, and the trade may have existed as early as the Roman era. From 1809 to 1910, 6,000 metric tons of ivory were "mined" from the Siberian tundra, the equivalent of tusks from an estimated 46,000 mammoths. Over the last 350 years, approximately 7,000 tons of mammoth ivory have been imported into China. Current predictions estimate that 550,000 tons of mammoth tusks have yet to be recovered from a single 1,000-kilometer coastal strip between the Yana and Kolyma rivers in Siberia.

Contrary to popular opinion, most commercially significant mammoth ivory is preserved rather than fossilized (*i.e.*, petrified). This preservation is credited to the frozen tundra environment in which the ivory has been buried for thousands of years. Carved and polished mammoth ivory is nearly indistinguishable from carved and polished elephant ivory. Both ivories have a creamy color and a unique "texture" or pattern of stacked chevron-like lines in cross-section. This pattern of lines, called the Schreger Pattern, is found only in proboscidean ivories. Analysis of the Schreger Pattern is the basis of a method developed by FWS Forensics Laboratory scientists to distinguish mammoth from modern elephant ivory.

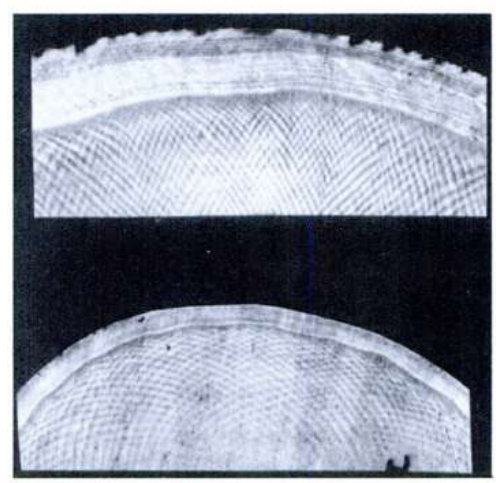
Proboscidean tusks are actually modified maxillary incisors (front upper teeth). Like any mammalian tooth, tusks are permeated by microscopic structures called dentinal tubules. Proboscidean dentinal tubules are unique because they are sinusoidal (wavy). The Schreger Pattern is actually an illusion of crossing shadow lines created by the wavy underlying microscopic dentinal tubules. When examined by scanning electron microscopy, the dentinal tubules are shown to be more tightly packed in mammoth ivory than in elephant ivory.

photo from the National Museum of Natural History, Smithsonian Institution

The woolly mammoth abounded in northern latitudes during the Pleistocene. This mount is a composite from several sets of skeletons uncovered near Fairbanks, Alaska, during the gold-mining days at the turn of the century. Mammoth tusks weighed up to 600 pounds per pair.

The angles that appear at the intersections of the Schreger lines in mammoth ivory are therefore consistently smaller (more acute) than those of elephant ivory. Using a protractor, FWS Forensics Laboratory scientists measured hundreds of Schreger Pattern angles from known samples of elephant and mammoth ivories. Statistical analysis of these measurements revealed that mammoth ivory angles averaged 73 degrees while the angles of elephant ivory averaged 124 degrees.

As soon as the Schreger Pattern angle method for differentiating mammoth and elephant ivories became available, incoming shipments of carved "mammoth" ivory were shunted to the FWS Forensics Laboratory by FWS wildlife inspectors. The first shipment originated from Hong Kong and contained 500 carved objects. FWS Forensic Laboratory scientists identified all 500 objects as being modern elephant in origin. The next Hong Kong shipment contained 400 "mammoth" pieces, 200 of which had actually been carved from elephant ivory. The following shipment of 600 items contained 597 mammoth ivory carvings and only three elephant ivory carvings. The other 1989 shipments were genuine mammoth in origin.



National Fish and Wildlife Forensics Laboratory photo

Measuring the angles formed by lines that make up the Schreger Pattern allows wildife inspectors to distinguish mammoth ivory (top) from elephant ivory (bottom).

A booklet outlining the simple, non-destructive Schreger Pattern angle measurement method was written by FWS Forensics Laboratory scientists and published by the World Wildlife Fund in 1991. This booklet also contains methods for the identification of the other types of natural and man-made materials appearing in the ivory trade.

It is interesting to note that since reliable identification methods have been applied to the ivory trade, FWS Forensics Laboratory scientists and wildlife inspectors have observed that the legal commerce in carved "ivory" objects has gradually shifted from mammoth tusks to include bone, warthog tusks, and hippopotamus teeth.

Edgard Espinoza and Mary-Jacque Mann are with the Clark R. Bavin National Fish and Wildlife Forensics Laboratory.

Recovery of the Black-footed Ferret: Looking Back, Looking Forward

by Jerry Godbey and Dean Biggins

One of the rarest mammals in the world, the black-footed ferret (*Mustela nigripes*) is a small, secretive, nocturnal carnivore that depends on prairie dogs (*Cynomys* spp.) for 90 percent of its diet and shelter. In 1967, the ferret was one of the first animals listed as an endangered species in the United States. During the more than 25 years since that time, government agencies, the private sector, conservation organizations, companies, and zoos have helped advance ferret recovery. Nevertheless, the future presents several challenges. Thus, from time to time, there is value in stepping back, reviewing the past, evaluating the lessons learned, and planning for the future.

History

The decline of the black-footed ferret is tied to the decline of the prairie dog. Because of persecution by humans and the effects of a presumably introduced disease (sylvatic plague), prairie dogs, the primary food source for black-footed ferrets, have declined in number by about 98 percent since the early 1900's. As the prairie dogs diminished, so did the ferrets. Small populations were studied from 1964 to 1974 in South Dakota and at the Fish and Wildlife Service's Patuxent Wildlife Research Center in Laurel, Maryland, but they eventually disappeared. Many people feared the species was extinct until 1981, when a population of ferrets was discovered near Meeteetse, Wyoming. In 1985, however, canine distemper — a disease fatal to ferrets — nearly wiped out the population. During the following 18 months, only 18 of the original 127 black-footed ferrets were taken in for captive breeding.

Plague also worked to destroy the ferret's habitat at Meeteetse by reducing the prey base. By 1992, plague had caused a 90 percent decline in Meeteetse prairie dogs and stopped any plan to reintroduce black-footed ferrets there. However, the last Meeteetse ferrets did provide stock for a successful captive breeding program. There are now more than 250 breeding adults in the program at various facilities throughout the country. During 1991-1993, the captive population supplied 187 "surplus" animals for reintroduction in Wyoming's Shirley Basin. Although some animals released in the Shirley Basin lived through the winter each year of the reintroduction, overall survival has been low due to wide dispersal and predation.

Wyoming Game and Fish Department photo

black-footed ferret

It's Difficult To Be A Black-Footed Ferret

Tests conducted during the 1991-1992 releases indicated that ferret predation by coyotes *(Canis latrans)*, badgers *(Taxidea taxus)*, and other predators was high. The 1991 release indicated an 86 percent loss of introduced animals within 90 days for the Shirley Basin population, compared to a 17 percent loss for a similar 90-day period in the wild Meeteetse population. In 1992, 26 percent of the released animals were lost to predation in just 18 days.

Dispersal from the release site also was recognized as a problem. Individuals that disperse far away from the release areas not only leave the best prairie dog habitat and expose themselves to predation, but are possibly lost to future mates. Wide variability in dispersal appears characteristic of cage-raised ferrets. In 1992, animals raised in prairie dog burrows within outdoor pens remained at the release site 4 to 6 times longer than cage-raised animals.

Problems Facing Ferret Recovery

Genetic variability in the current black-footed ferret population is known to be low, and additional loss of variation

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Reaching Out in Wyoming: A Black-footed Ferret Success Story

by Mary Maruca

Amigo is a children's book about a boy named Francisco, whose family cannot afford to own a dog. Francisco finds unexpected companionship in the company of a prairie dog, whose own family has warned him against forming an attachment to a human child. But the boy and the prairie dog do hit it off and, contrary to the advice of all their favorite relations, they become fast friends.

Moral of the story? From at least one perspective, it epitomizes the complementary relationship possible in nature—animals of different sorts finding ways to accommodate each other. However, in the adult world most of us are familiar with, such accommodation can be more difficult to come by, and may indeed require more negotiation skills than those needed by a small boy and a friendly prairie dog eager for companionship.

photo © Wendy Shattil / Bob Rozinski

Prairie dogs are the main food source for black-footed ferrets. These young black-tailed prairie dogs were photographed at the Rocky Mountain Arsenal, Colorado.

Take the case of the black-footed ferret. This member of the weasel family has suffered by its close association with prairie dogs. At different times during their long history of contact with humans, prairie dogs have been regarded as akin to weeds. Perceived as competitors for forage, these burrowing rodents have been shot, trapped, poisoned, and dispossessed of habitat until the "towns" that once covered millions of acres from Canada to Mexico have been reduced to approximately 2 percent of their original range. Indeed, since passage of the Endangered Species Act, two out of the five prairie dog species have been listed as Threatened or Endangered. All in all, this has spelled bad news for ferrets, which take more than 90 percent of their diet from the ranks of their prairie dog neighbors.

As prairie dogs declined, so did ferrets. What was thought to be the last population of ferrets came to light in South Dakota in 1963. When that population died out in the late 1970's, the species was thought to be extinct. Then, in 1981, a ranch dog killed a black-footed ferret near Meeteetse, Wyoming. Research subsequently documented a population of more than 120 animals nearby. However, after an outbreak of canine distemper almost wiped out the Meeteetse ferret population, the last 18 were captured between 1985 and 1987 for the captive breeding program. Captive ferrets now range in number between 240 and 350 animals.

If one were simply to look at the numbers, it might appear that the hero of the story would be the captive breeding program. Yes, the ferret population has surged in this artificial environment, but a captive breeding facility offers nothing like the wild natural attractions of Meeteetse. If ferrets were truly to recover, they would have to be reestablished in the wild. But more than sound biology and a protective law were required to make that particular effort a success, especially in a part of the country where prairie dog towns were regarded as a sure sign of deteriorating rangeland, and where private landowners seldom felt comfortable with Federal intervention in their ranching practices. So what was the next step for ferrets and ranchers? Was it conceivable that "Feds" and landowners, potentially facing each other from opposite sides of the fence, could find a way to meet at the same fence post and become amigos after all?

The Black-footed Ferret Advisory Team provided the model, representing not only the Fish and Wildlife Service, which has responsibility for ferret recovery, but State, local, and private interests also. The Wyoming Game and Fish Department served as the mediator at the local level. Representatives went door to door, contacting landowners, alerting them to developing plans, and sharing ideas. The presence of the well respected Game and Fish Department forestalled some of the potential for tension. Jack Turnell, manager of the Pitchfork Ranch near Meeteetse, also did yeoman's work as the spokesperson for local interests on the Advisory Team. He was a central presence as long as Meeteetse was considered a possible reintroduction site. But when a

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Reaching out in Wyoming

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bout of sylvatic plague struck the prairie dog population that otherwise would have supported the ferrets, the reintroduction site shifted to Wyoming's Shirley Basin, where local rancher Bill Ellis became an influential part of the Shirley Basin/Medicine Bow Working Group.

According to Bill Ellis, if the Endangered Species Act had not been a factor in the ferret issue, anyone could have come into the community with "a sack of black-footed ferrets and asked if they could have been dumped out on people's lands, and the ranchers would have said 'yes.'" The Endangered Species Act made the difference in attitude, according to Ellis. Even though ranchers held no hard feelings toward the ferrets, the authority of the Act made them feel the government could step in, impose changes on their lives, and give them no voice in the reintroduction process. Contributing to the Shirley Basin/Medicine Bow Working Group as a spokesperson for ranching interests helped Ellis change that perception. He decided to get involved early on when the switch to Shirley Basin was made, because getting involved not only made him part of the process on his own terms, but also part of the solution. Although he represented landowner interests, he spoke from his own perspective. "I had to make decisions and stand by them," he observed, explaining that he provided input based on what he thought livestock owners could live with.

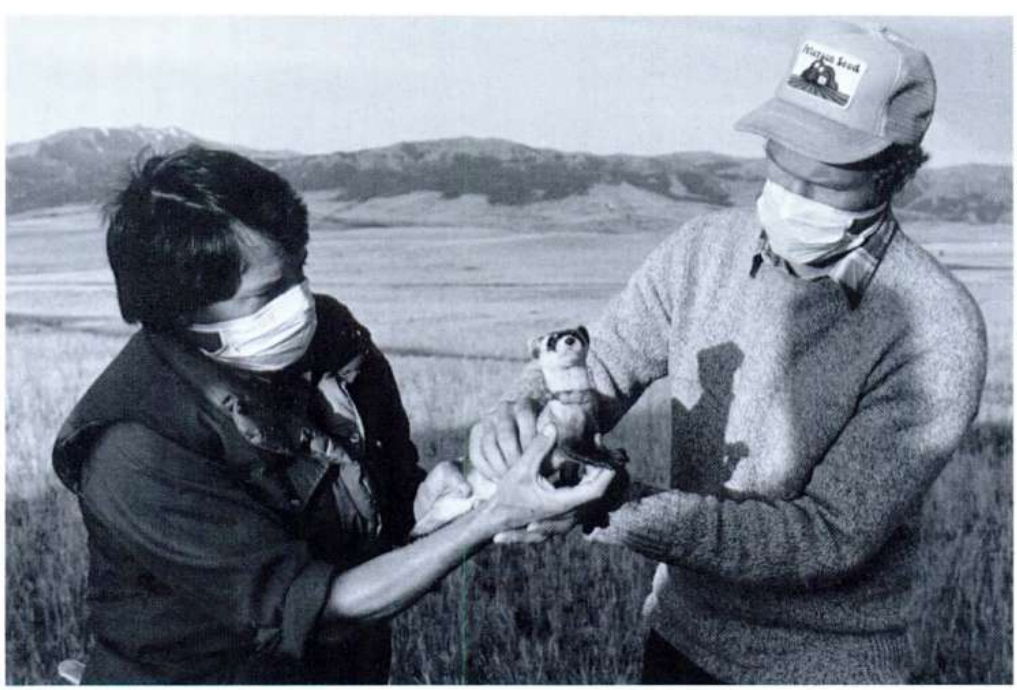
His main concern about the process of reintroduction was that it not interfere either with the business of ranching or the lifestyle of the ranchers. To protect both of these, he and others attending the meetings wanted the management plan guiding ferret reintroduction to specify the maximum number of ferret workers that could be in the field at any one time. "People here are used to a solitary life," Ellis said. "Even if agencies have people out every day doing their jobs and not bothering anybody, we still know they're out there. It wears on nerves." Six people at any one time was the maximum eventually specified in the plan.

Developing the management plan took approximately a year from start to finish—all in all, a quick timetable for creating such a document, considering the number of interests involved and the variety of individuals consulted. Oil, gas, coal, recreation, and livestock interests were all involved in the decisionmaking process. Ellis believes it was "the quality of people in the meetings that made them work." Common sense and sensibility helped resolve most conflicts. "Nothing remains to be worked out," Ellis said. "It's all running smoothly." Part of the plan's smooth functioning may have had to do with the team's efforts to foresee the possibility of future problems. A process for amending the plan was included in the completed document.

Steve Brockmann, who works with the ferret reintroduction program in the Fish and Wildlife Service's Cheyenne, Wyoming, Field Office, indicated that the designation of reintroduced ferrets as a "nonessential experimental population" allayed ranchers' concern that accidentally killing a ferret would result in Federal prosecution. The experimental population provision of the Endangered Species Act promotes public acceptance of reintroduction by authorizing additional flexibility in the management of released animals and their habitat. Essentially, the reintroduced population's status as "nonessential" made all existing land practices acceptable. It took away much of the concern associated with the provisions of the Endangered Species Act. This was the message that Bill Ellis shared with his fellow ranchers — that compromise was possible, and that ranchers in conjunction with the Federal government could accomplish what they needed to accomplish without sacrifice.

Ferret reintroduction probably won't stop with Wyoming. Proposals to establish experimental populations in South Dakota and Montana have already appeared in the *Federal Register.* Bill Ellis even has a few thoughts on how the process of reintroduction might go more smoothly in these States. "Get involved," he advises other ranchers. "That's the best way to watch out for your interests."

"This works," he says, referring to the management plan he helped develop and the reintroduction process that resulted. "It's a great example of Federal, State, and local groups sitting down and successfully hammering something out."



Wyoming Game and Fish Department photo

Wearing masks while handling ferrets minimizes the risk of transmitting disease to the animals.

Mary Maruca is Chief of the Branch of Correspondence and Information, Office of Administration, Fish and Wildlife Service, Washington, D.C.

Recovery of the Black-footed Ferret

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in the future is unavoidable. Only 8 of the 18 original animals captured at Meeteetse for the captive breeding program were believed unrelated enough to be considered genetic founders. Abnormal physical features (including webbed feet, kinked tails, short tails, oddly formed teeth, and internal hemorrhaging in kits) have been seen in some captive-born animals. Characteristics that favor survival and reproduction in captive animals may be different from those contributing to fitness of free-ranging ferrets.

Captivity can affect animals in other ways, too. The unnatural cage environment may not help develop critical behavioral skills, a problem currently receiving research attention. Behavior is determined by environmental and genetic influences, but behaviors can be altered if a critical influence is absent or distorted.

Diseases also pose threats to the ferret recovery program. The potential effect of canine distemper is evident from the Meeteetse experience. Currently, only short-term vaccine is available, and no protection exists for young born in the wild. Plague in prairie dog populations may be equally serious as a loss of prey, but little is known about the direct effects of plague on black-footed ferrets.

Although some potential ferret reintroduction sites have been identified, few suitable areas that are large enough still exist. Past and ongoing prairie dog poisoning programs, conversion of prairie dog towns to agricultural or urban uses, and the introduction of sylvatic plague have greatly reduced the prairie dog's geographic distribution. Unfortunately, nearly 130 other grassland animal species are associated with the prairie dog and may suffer related declines.

The Human Factor

The human dimensions of the ferret recovery program are as complex as any other facet. Philosophies and personalities of professionals working within the ferret program vary widely, and lively debates have been common. Identifying problems and re-examining mistakes can help us avoid repeating them, both in the ferret program and in other programs focusing on endangered species. In our opinion, the following are some of the most important lessons to emerge from the past 25 years of ferret conservation efforts:

First, avoid "putting all your eggs in one basket." Captive breeding and translocation of ferrets from the Meeteetse population should have begun earlier. Reintroductions also need to be in various locations.

Second, don't "re-invent the wheel." In several cases involving both research on free-ranging ferrets and management of captive ferrets, too little attention was paid to failures and successes during previous work at South Dakota and Patuxent.

Third, resist "preservation paralysis." At Meeteetse, realization that the small ferret population might be the last in existence motivated a protectionist attitude that restricted aggressive management options and decreased the options now available for the ferret program.

Finally, it is important to address the concerns of all parties involved in endangered species recovery. Federal agencies are required by the Endangered Species Act to do everything they can to ensure the survival of the species. State agencies, communities and individuals may not agree with this. Discussion, understanding, and compromise are of paramount importance.

Conclusion

A great deal of agency cooperation and teamwork has been expended in the ferret recovery effort. No single agency or group of individuals has the expertise or resources to be successful on its own. Within the ferret program, outstanding examples of cooperation have been demonstrated in the private sector, including ranchers, conservation organizations, companies and zoos. We hope this cooperation not only continues but grows. We remain grateful to the many cooperators and contributors for their support.

photo by Jerry Godbey, National Biological Survey

Ferret training facilities in Pueblo, Colorado: Formerly implement sheds where the U.S. Army stored large machines, these 5000 square-foot buildings have been converted to prairie dog towns, where captive-bred black-footed ferrets—which may not recognize their prey—learn to hunt.

Jerry Godbey and Dean Biggins are with the National Biological Survey, National Ecology Research Center, in Fort Collins, Colorado.

Listing Proposals — October/November 1993

photo by Kenneth Heil

The Winkler cactus is a small, globose species that produces attractive pink or peach-colored flowers. It was described and named by Dr. Kenneth Heil in honor of Agnes Winkler, who discovered the cactus in the early 1960's.

Eleven species — seven plants and four animals — were proposed by the Fish and Wildlife Service during October and November 1993 for listing as Threatened or Endangered. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Six California Chaparral Plants

Protection for six plant taxa associated with southern maritime chaparral, a distinctive plant community found only along the coast of southern California and northern Baja California, Mexico, was proposed October 1. The four plants most vulnerable to extinction were recommended for listing as Endangered:

- **Del Mar manzanita** ***(Arctostaphylos glandulosa ssp. crassifolia)*** - a shrub in the heath family (Ericaceae) with white flowers and dark red bark;
- **Encinitas baccharis** ***(Baccharis vanessae)*** - a fall-blooming shrub in the aster family (Asteraceae);
- **Orcutt's spineflower** ***(Chorizanthe orcuttiana)*** - a low-growing, yellow-flowered annual in the buckwheat family (Polygonaceae); and
- **short-leaved dudleya** ***(Dudleya blochmaniae ssp. brevifolia)*** - a low-growing, white-flowered succulent in the stonecrop family (Crassulaceae).

Because the danger to the other two plants is not as immediate, they were proposed for listing as Threatened:

- **Del Mar sand aster** ***(Corethrogyne filaginifolia var. linifolia)*** - an erect perennial herb bearing flowers containing violet ray florets and yellow disk florets; and
- **big-leaved crown-beard** ***(Verbesina dissita)*** - a low-growing shrub with yellow flowers, and another member of the aster family.

Southern maritime chaparral is a low growing, relatively open plant community frequently restricted to sandy coastal terraces, and has high species diversity. Approximately 85 percent of this habitat has been lost to agriculture and urbanization. Most of the remaining 15 percent is on private property in San Diego County, and is subject to further habitat modification or fragmentation. The situation facing southern coastal chaparral in northern Baja California is much the same.

Winkler Cactus *(Pediocactus winkleri)*

Thought to be one of the rarest cacti in the U.S., this species is known from 6 populations totalling about 3,500 plants on 200 acres (800 hectares). All of the sites are in south-central Utah on habitat administered by the Bureau of Land Management (BLM) and at a site on the adjacent Capitol Reef National Park.

Because of its rarity and attractive appearance, the Winkler cactus is prized by many hobbyists. In one area, an estimated 80 percent of the plants have been taken by collectors in the past 10 years. Additionally, off-road vehicles and livestock have destroyed many cacti and degraded their habitat. Cattle grazing is allowed within the park as well as on the BLM land. In light of these threats, the FWS proposed October 6 to list the Winkler cactus as Endangered.

Flat-tailed Horned Lizard *(Phrynosoma mcallii)*

One of seven species of horned lizards in North America, *P. mcallii* is distinguished by its long, slender head spines, a dark vertebral stripe, and — as its common name indicates — a flattened tail. It is found in sandy flats and valleys of the western Sonoran Desert from the Coachella Valley south through the Imperial Valley, California, and in the vicinity of the Colorado River delta, the Gran Desierto, and Bahia de San Jorge in Mexico and Arizona.

Approximately 40 percent of the lizard's habitat in California has been converted to agricultural or urban uses, or was inundated by the creation of the Salton Sea in 1905-1907. Over 20 percent of the habitat in Arizona and Mexico has been lost to similar uses. Most of what remains is fragmented and degraded. An estimated 95 percent of the current suitable habitat in California and 35 percent in Arizona is threatened

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Listing Proposals

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by further agricultural and urban development, off-road vehicle use, geothermal energy development, sand and gravel mining, road construction, and construction of utility corridors, as well as pesticide spraying of ant populations — the primary prey of the flat-tailed horned lizard. Because of these threats, the FWS proposed November 29 to list the species as Threatened.

Two Georgia Fishes

Two small, colorful fishes endemic to the Etowah River system in northern Georgia were proposed October 18 for Endangered Species Act protection:

- **Etowah darter** ***(Etheostoma etowae)*** - a small, brown or grayish-olive fish with small, dark spots just below the lateral line. Breeding males have a greenish-blue breast. This species was proposed for listing as Endangered.
- **Cherokee darter** ***(Etheostoma sp.)*** - a white to pale yellow fish with olive-black lateral bars and a row of small, dark dorsal saddles. Once confused with another fish, the Cherokee darter is now recognized as a distinct taxon, and a formal scientific description is being prepared. Believed to be in somewhat less danger than the Etowah darter because of a wider distribution, the Cherokee darter was proposed for listing as Threatened.

Both fishes inhabit clean, free-flowing streams with rocky substrates, and neither can survive in impoundments.

The Etowah River system once supported a significant diversity of aquatic wildlife, but many of its animals are now rare. Species from this system already listed as Endangered or Threatened include one fish and five mussels. Another nine species from the system — one mussel, five fishes, and three aquatic snails — are candidates for listing. Much of the historical habitat has been modified or degraded by impoundments, siltation, and pollution. Dams not only block the river flows but also fragment populations and alter downstream water temperatures. The degradation of water quality comes from municipal and industrial discharge sites, and non-point sources such as runoff from agricultural and silvicultural operations.

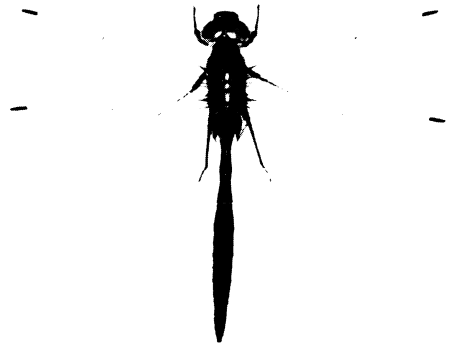

photo by E.D. Cashatt

Hine's Emerald Dragonfly *(Somatochlora hineana)*

Bright emerald-green eyes, a metallic green thorax, and creamy-yellow lateral stripes make this wetland insect a distinctive species. It once occurred in Indiana and Ohio, but the only currently known populations are in three counties in the Chicago, Illinois, metropolitan area and in Door County, Wisconsin.

The primary threat to Hine's emerald dragonfly is the loss or degradation of its habitat. This species occurs around shallow, springfed streams with associated wet meadows and cattail marshes. Within its limited range, the insect's wetland habitats are subject to: draining or filling for agricultural, recreational, and industrial development; pesticide drift and runoff; and ground water contamination from a wide variety of sources.

Because of the species' restricted range, low numbers, and vulnerability, the FWS proposed October 4 to list Hine's emerald dragonfly as Endangered.

* * *

Available Conservation Measures

Among the conservation benefits authorized for Threatened and Endangered plants and animals under the Endangered Species Act are: protection from adverse effects of Federal activities; restrictions on take and trafficking; a requirement that the FWS develop and carry out recovery plans; authorization to seek land purchases or exchanges for important habitat; and Federal aid to State and Commonwealth conservation departments with cooperative endangered species agreements. Listing also lends greater recognition to a species' precarious status, encouraging other conservation efforts by State and local agencies, independent organizations, and concerned individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they fund, authorize, or carry out are not likely to jeopardize the survival of any Endangered or Threatened species, or to adversely modify its designated Critical Habitat (if any). When an agency finds that one of its activities may affect a listed species, it is required to consult with the FWS to avoid jeopardy. If necessary, "reasonable and prudent alternatives," such as project modifications or rescheduling, are suggested to allow completion of the proposed activity. Where a Federal action may jeopardize the survival of a species that is *proposed* for listing, the Federal agency is required to "confer" with the FWS (although the results of such a conference are not legally binding).

Additional protection is authorized by section 9 of the Act, which makes it illegal to take, import, export, or engage in interstate or international commerce in listed animals except by permit for certain conservation purposes. The Act also makes it illegal to posses, sell, or transport any listed species taken in violation of the law. For plants, trade restrictions are the same but the rules on "take" are different. It is unlawful to collect or maliciously damage any Endangered plant on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law, or in the course of violating a State criminal trespass law, also is illegal under the Act. In addition, some States have more restrictive laws specifically against the take of State or federally listed plants and animals.

Nile Crocodile Reclassified from Endangered to Threatened

by Ann Haas

Recognizing the improved status of the Nile crocodile *(Crocodylus niloticus)* in response to conservation measures, the Fish and Wildlife Service (FWS) reclassified the species throughout its range from Endangered to Threatened, effective October 21, 1993. The special rule for the Zimbabwe population of the Nile crocodile, already classified as Threatened, remains in effect, allowing the importation of trophies and skins directly into the United States.

The Nile crocodile is the largest of the three African species of crocodiles and among the largest worldwide, reaching a length of up to 7 meters (23 feet). Its upper surface ranges from yellow to dark olive, and its lower surface is usually uniformly light and without dark blotches. Unlike the other African species, the African slender-snouted crocodile (*Crocodylus cataphractus*) and the dwarf crocodile (*Osteolaemus tetraspis*), the Nile crocodile either completely lacks or has only small bony plates in the belly scales (Brazaitis, personal communication). Thus, the skin of the Nile crocodile is utilized to produce a high quality leather and has historically been one of the mainstays of the commercial crocodile leather trade (Brazaitis, 1973).

The Nile crocodile lives in a range of aquatic habitats, including rivers, lakes, and swamps. It may even occur in salt water. A major predator and opportunistic feeder, the Nile crocodile occupies many niches on land and in water (Cott, 1961.) It is a significant component of the food web and ecology of the region it inhabits, first feeding on insects and crustaceans, then fish and small mammals, and finally, as an adult, killing and consuming large mammals, thereby helping to control populations of herbivores such as antelopes, waterbucks, lechwes, zebras, and warthogs. The crocodile may take domestic goats and cattle, and, as a scavenger, it also eats carrion. Because of its large size, the Nile crocodile has been known to attack humans, generally after learning to associate them with sources of food (such as fish-cleaning stations) or by mistaking people for prey, if they bathe in the early evening or morning when the reptile hunts (Brazaitis, personal communication).

The Nile crocodile's intricate food web shows, in part, interspecific competition and reciprocal predation (Cott, 1961). In particular, the Nile monitor lizard (*Varanus niloticus*) preys heavily on the eggs of Nile crocodiles and, presumably, African pond or mud turtles (*Pelusios*). In turn, the crocodile preys on both species, and all compete for freshwater crabs. Further, the crocodile and monitor take frogs, while the turtle takes tadpoles (Cott, 1961).

The Nile crocodile is ecologically important in benefiting commercially valuable fish. Crocodiles take *Clarias* (airbreathing or "walking" catfish), which prey on desirable *Tilapia* (mouthbrooder fish), including its fry and eggs. By controlling these predator fish, the Nile crocodile helps ensure the survival of *Tilapia* as food for people.

A species whose ancestors date back more than 200 million years, the Nile crocodile once occurred throughout Africa and as far north as Syria. According to Dr. Roy McDiarmid of the National Museum of Natural History, the Nile crocodile has also been reported to occur in the Comoros and Seychelles Islands. It is now confined mainly to the upstream regions of the Nile, tropical and southern Africa, and Madagascar.

Early this century, bounties were paid for Nile crocodile hides, and in the 1950's and 1960's, wholesale slaughter of the animals for the commercial hide business threatened many accessible populations with extinction (Hutton, 1988). Nile crocodile numbers also declined because of habitat alteration — such as clearing forests and draining wetlands — and killing to eliminate threats to humans, livestock, and the fishing industry. In 1970, the species was listed as Endangered. In 1975, when the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) came into force, the Nile croco-

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drawing by Handelsman © 1991 *The New Yorker Magazine*

"Tell us again about Bogie and Hepburn coming up the river."

Nile Crocodile Reclassified

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dile was listed on Appendix I in view of its widespread decline.

CITES is an international conservation treaty, now signed by 120 countries, to regulate trade (import, export, and re-export) in animal and plant species listed on its three appendices, using a system of permits. While allowing sustainable trade, CITES is designed to prevent trade from threatening the survival of species. Trade in Appendix I species is most strictly regulated because their biological status in the wild is most precarious; trade for primarily commercial purposes is prohibited. Trade in Appendix II species is allowed if both the exporting and importing countries have issued the proper permits.

Nile crocodile populations have generally recovered to the point at which they are increasing or at least stabilized, thanks to years of protection and additional habitat created by impoundments. Zimbabwe's protection of the Nile crocodile and the U.S. import restrictions under the Endangered Species Act have helped the species recover. Range countries have recognized the value of the crocodile to the riverine ecosystem and as a source of sustainable economic benefit, especially through ranching for controlled harvest of skins.

Crocodile Ranching and Export Quotas

Zimbabwe was the first country to develop data about its wild populations of Nile crocodiles and the first to have its proposal for managing the species by ranching accepted by CITES. In ranching operations, some eggs are taken from the wild and reared in captivity. In turn, some of the hatched young are returned to the wild. Ranching has been successful for the Nile crocodile because the animals grow quickly in captivity, particularly during their early years.

In 1984, CITES officials meeting in Belgium devised a quota system as an alternative to ranching, allowing countries to utilize wild populations of Nile crocodiles. Under the quota system, Nile crocodile populations in nine African countries — Cameroon, Congo, Kenya, Madagascar, Malawi, Mozambique, Sudan, Tanzania, and Zambia — were transferred from Appendix I to Appendix II, subject to export quotas established by agreement of the Parties. In 1986, the Botswana population was added.

In 1987, export quotas were renewed for all 10 countries, and the CITES Secretariat began its species survey in eastern and central Africa and Madagascar. Also in 1987, the FWS reclassified Zimbabwe's ranched and wild populations of Nile crocodiles under the Endangered Species Act from Endangered to Threatened.

At the 1992 CITES Conference of Parties in Kyoto, Japan, Nile crocodile populations in Botswana, Ethiopia, Kenya, Malawi, Mozambique, Tanzania, Zambia, and Zimbabwe were listed on Appendix II under ranching provisions. Populations in Madagascar and Somalia remained on Appendix II under the quota system, although the quota for Somalia is zero at least through 1994. Populations in South Africa and Uganda were transferred from Appendix I to Appendix II with export quotas.

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Final Listing Rules

Final rules extending Endangered Species Act protection to four species —two plants and two animals — were published in October and November 1993:

• **Star Cactus** (*Astrophytum asterias*) - a small, strikingly attractive plant native to subtropical grasslands and shrublands of the Lower Rio Grande Valley. Habitat modification and collecting for the cactus trade have reduced this cactus to two known sites, one in Starr County, Texas, and one in Tamaulipas, Mexico. Because of continuing threats, the species was listed October 18 as Endangered.

• **Beach Jacquemontia** (*Jacquemontia reclinata*) - a perennial vine in the morning-glory family (Convolvulaceae) endemic to coastal barrier islands in southeast Florida from Miami northward to Palm Beach County. The vast majority of its habitat has been destroyed by urban development. The remaining populations are small, fragmented, and vulnerable to invasions of exotic plant species. On November 24, the beach jacquemontia was listed as Endangered.

• **Giant Garter Snake** (*Thamnophis gigas*) - a non-venomous snake restricted to wetland habitats in portions of California's Central Valley. Due to extensive habitat loss and fragmentation, and the effects of introduced predators, the species is extirpated, or nearly so, throughout two-thirds of its original range. The potential for further habitat loss led the Fish and Wildlife Service to list the giant garter snake on October 20 as Threatened.

• **Oregon Chub** (*Oregonichthys crameri*) - a small fish that historically inhabited sloughs, overflow ponds, and other backwater habitats throughout the Willamette River drainage in Oregon. Habitat modification resulting from dam construction has eliminated the species from 98 percent of its former range. The remaining populations are reduced to an 18.5-mile (30-kilometer) stretch of the Middle Fork Willamette River system. Because of continuing threats, the Oregon chub was listed October 18 as Endangered.

New Plan Outlines Steps to Recover Endangered Fishes of the Colorado River System

by Connie Young

Four Endangered fish species endemic to the Colorado River system are expected to benefit from a new 5-year Recovery Action Plan completed October 15, 1993, by the Fish and Wildlife Service (FWS). The plan calls for protecting river flows, building fish passageways around dams, and releasing limited numbers of hatchery-reared native fish into the wild. It was the result of a multi-agency program to recover the Colorado squawfish (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail chub (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*) while allowing for future water development.

Along with the plan is an agreement among State and Federal agencies, environmental groups, and water user organizations clarifying how section 7 of the Endangered Species Act will be applied to new and existing water development projects in the upper Colorado River Basin. Completion of actions identified in the plan will be considered by the FWS in its review of new and existing water projects that require a Federal permit.

"Research has shown us what needs to be done; we're now going to begin aggressively implementing actions needed to recover the fish," said John Hamill, an FWS biologist who directs the Recovery Program for Endangered Fish of the Upper Colorado River Basin (Recovery Program). "We will use the Recovery Action Plan to keep the Recovery Program accountable for actions that need to be accomplished to recover the fish."

Highlights of the plan include the following:

• In-stream flows will be targeted for protection in the Colorado, Gunnison, Dolores, Green, Yampa, White, Little Snake and Duchesne Rivers. The most significant changes are in the Green River downstream of Flaming Gorge Dam, and in the Gunnison River below Blue Mesa Dam. On a trial basis, water from these two dams is being released to mimic historical high spring flows and lower, more stable flows the rest of the year. State and Federal biologists are monitoring effects on endangered fishes.

• Selected dikes, levees, and other barriers to critical wetlands or flooded bottomlands will be removed or altered, making the sites available for use by Endangered fish. Young native fish that use these nutrient-rich areas grow rapidly and become large enough to then fend for themselves in the river. Wetlands targeted for enhancement include the Ouray National Wildlife Refuge on the Green River in northern Utah, a site on the Colorado River near Moab, Utah, and the Escalante State Wildlife Area on the Gunnison River downstream from Delta, Colorado.

• Fish ladders and other passageways will be built to allow Endangered fish to reach more of their historical range. For example, construction is set to start in 1995 on a fish ladder at Redlands Diversion Dam on the lower Gunnison River and on passageways around agricultural diversion structures on the Yampa River.

• Guidelines are being developed by the FWS and the States of Colorado, Utah, and Wyoming to address the stocking of non-native fish in upper Colorado River Basin lakes and reservoirs. These guidelines will be aimed at minimizing the risks to Endangered fish from predation, competition, and disease associated with non-native species while providing sport-fishing opportunities.

• Recovery Program participants will assist agencies outside the program in evaluating and reducing potential harm to Endangered fish from such environmental contaminants as selenium, petroleum derivatives, heavy metals, and uranium.

• Raising limited numbers of Endangered fish in hatcheries to be stocked in the wild will be evaluated. In 1994, for example, razorback suckers will be stocked in some of the species' historical habitat in the Gunnison River, where

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Fish and Wildlife Service photo

Three boys pose with a 17-pound Colorado River squawfish they caught in the Green River in the early 1920's. Colorado squawfish once grew to lengths of nearly 6 feet and were called "white salmon" by early settlers. Now endangered, these fish are found nowhere but in parts of the Colorado River Basin.

New Plan

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none has been found in recent years. Biologists will evaluate the results of this action over the following 2 years. Also, a plan to reintroduce bonytail chubs throughout the upper Colorado River Basin will be developed by 1995. Bonytails are nearly extinct in the wild.

The viability of the stocking approach is uncertain, however. Hatchery-raised Endangered fish previously stocked in the Colorado River downstream of Lake Powell have not survived. Biologists want to ensure that stocking will be successful before continuing.

Addressing the Impacts of Federal Actions

Section 7 of the Endangered Species Act prohibits Federal agencies from taking actions likely to harm listed species or adversely modify any designated Critical Habitat. If a Federal agency finds that an activity it plans to authorize, fund, or carry out may affect a listed species, that agency must consult with the FWS. After consultation, the FWS renders a Biological Opinion on the proposed activity. If it finds that the action would likely jeopardize the listed species or adversely modify Critical Habitat, the FWS must identify any possible "reasonable and prudent alternatives." The FWS is responsible for assessing the impacts on Endangered Colorado River fishes from any water projects that require section 7 consultation. In the January 29, 1993, *Federal Register*, the FWS proposed to designate Critical Habitat for the four Endangered Colorado River fishes (see *Bulletin, Vol. XVIII, No. 2*), and a final decision is expected by March 1994.

Under the new agreement, the FWS will determine if enough progress has been made toward restoring the Endangered fish to allow implementation of the Recovery Action Plan to serve as a reasonable and prudent alternative in any jeopardy Biological Opinion. If not enough progress is being achieved, Biological Opinions for new and historic projects will identify which actions in the Recovery Action Plan must be completed to avoid jeopardy.

Without this section 7 agreement, operators of existing water projects would have sole responsibility to offset any harm their projects could cause Endangered fish.

"The agreement represents a significant departure from the traditional approach to section 7 consultation on water development projects," Hamill said. "Instead of relying on project sponsors to offset the impacts of a project, the Service will consider the accomplishments of the Recovery Program. This approach has benefits both for water developers and Endangered fishes."

Recovery Program participants are the Fish and Wildlife Service; U.S. Bureau of Reclamation; Western Area Power Administration; States of Colorado, Utah and Wyoming; Colorado River Energy Distributors Association; water developers; and environmental organizations.

For more information, call the FWS Denver Regional Office at (303) 236-2985.

Connie Young is the Information and Education Coordinator for the Colorado River Recovery Program in the FWS Denver Regional Office.

Diseases Cited in California Sea Otter Deaths

Concerned that the growth rate for the California population of the southern sea otter (*Enhydra lutris nereis*) was not achieving the success of the species elsewhere, the recovery coordinator enlisted the expertise of the National Wildlife Health Research Center to determine the cause of death for the 22 marine mammals found dead during 1992.

"Despite the small sample size, we found the frequency of fatal infectious disease unusually high in comparison with other endangered or threatened species," said Dr. Nancy Thomas, veterinary pathologist at the Madison, Wisconsin, health laboratory. "The deaths of 10 animals were attributable to infectious or parasitic diseases."

During the 1980's, southern sea otter recovery efforts focused on developing the recovery plan and implementing the highest priority tasks—minimizing threats and risks of oil spills and minimizing incidental take in fishing gear. Through Region 1, the recovery program coordinator recommended standards of operation for offshore oil development and coastal tanker traffic and initiated the sea otter translocation program as the cornerstone task to minimize oil spill risk. California State legislation prohibited gillnet fishing in waters 30 fathoms and less, reducing the level of incidental take to nearly zero. In 1989, a new recovery team was established to review and revise the 1982 southern sea otter recovery plan. Despite these initiatives, the growth rate of the California sea otter population has been well below that of most of the populations in Washington, Alaska, and Canada.

Infectious diseases identified in southern sea otters included coccidioidomycosis, aberrant acanthocephalan parasite migration, and protozoal encephalitis.

Three sea otters from San Luis Obispo County were diagnosed as dying from coccidioidomycosis, also known as San Joaquin Valley fever, which is caused by the fungus *Coccidioides immitis*. The organism grows in its vegetative (hyphal) form in the soil, infecting humans and animals most commonly via windblown spores. Animal-to-animal transmission is a rare event. Endemic to certain areas of the southwestern United States, particu-

(continued on page 20)

Diseases Cited in Sea Otter Deaths

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larly the Central Valley of California, this disease is only sporadically reported in other areas of the State. Every year since 1971, a few cases of human coccidioidomycosis were reported in San Luis Obispo County; however, there were dramatic increases in such cases in 1978 and 1992. One sea otter found in San Luis Obispo County in 1976 had this disease, although as far as we know it is not a common diagnosis as a cause of morbidity or mortality in the animals.

Five sea otters—1 adult and 4 immature—were diagnosed as dying from aberrant acanthocephalan parasite migration into the abdominal cavity. While certain species of acanthocephalans are normal inhabitants of the intestinal tract of sea otters, the aberrant migrating acanthocephalans are larval stages that have passed through the intestinal wall and attached to many abdominal organs. Parasitologists at the University of Nebraska have tentatively identified the migrating acanthocephalans as belonging to a group that usually infects birds—primarily gulls or scoters—and may be transmitted through ingestion of anomuran sand crabs. Although this problem has rarely been cited in individual sea otters in the past, it may be emerging as a potentially significant population health problem.

Two sea otters found convulsing on a beach in San Luis Obispo County were found to have encephalitis caused by a protozoal parasite, not definitely identified to date. This is a newly identified problem in the otters.

Causes of death in 12 sea otters included emaciation or mating wounds or both (7), various types of trauma (4), and intestinal perforation with twisting of the intestine (1). These causes of mortality have been reported in sea otters in the past.

"When monitoring the status of Endangered, Threatened, or candidate species, we are constantly challenged with early detection of insidious threats," said Carl Benz, wildlife biologist at the Ventura, California, field office. "Because of the support of the National Wildlife Health Research Center, the Service can be attentive to the problem of infectious and parasitic diseases and their threat to the recovery of the southern sea otter and the health of the nearshore ecosystem."

Necropsies of southern sea otters at the National Wildlife Health Research Center in 1993 have documented some of the same disease problems, including coccidioidomycosis, acanthocephalan peritonitis, and protozoal encephalitis. The Center will continue comprehensive necropsies in order to provide important information to aid the recovery of this Threatened species.

Material for this article was provided by Dr. Lynn Creekmore, Wildlife Disease Specialist, and Dr. Nancy Thomas, Endangered Species Pathologist, both of whom are with the National Wildlife Health Research Center in Madison, Wisconsin. The Center is a unique Federal research facility dedicated to research, diagnosis, and prevention of disease in free-ranging wildlife. Carl Benz, the FWS Southern Sea Otter Recovery Program Coordinator from 1979 to 1993, also provided material. Mr. Benz is now executive secretary to the recovery team and Assistant Supervisor of the FWS Ventura, California, Office.

Reclassification Proposals

(continued from page 1)

possibility of erosion from logging within the lake watershed, and the potential damage or destruction of the single population from chance events.

* * *

The reclassification proposals recognize the improved status of these plants. Even if reclassified, however, both species will continue to receive Endangered Species Act protection until they are fully recovered. With the continued cooperation of Federal and State agencies, conservation organizations, and concerned landowners, the FWS will work to restore both plants as secure, self-sustaining members of their ecosystems.

Taiwan and China Warned

(continued from page 4)

ing; (3) development and implementation of a comprehensive law enforcement and education action plan; (4) increased law enforcement penalties; and (5) prompt termination of amnesty periods for illegal holding and commercialization.

The FWS is participating in two CITES delegations to China and Taiwan, as well as to Korea. The first is to provide technical assistance, and the second is to evaluate their progress between now and the upcoming March 1994 CITES Standing Committee meeting. In addition, the United States is sending its own delegation, consisting of FWS CITES and law enforcement experts, and staff from the Department of Justice, to help these countries make progress in ending the trade. The FWS is also participating with the Department of Interior's Office of Policy Analysis in an interagency task force led by the National Security Council to assist China and Taiwan in eliminating their illegal wildlife trade and to evaluate their progress by the March 1994 deadline.

Denise Henne is with the Branch of Correspondence and Information, Office of Administration, Fish and Wildlife Service, Washington, D.C.

Regional News

(continued from page 2)

Fish and Wildlife Service photo

whooping cranes at Aransas National Wildlife Refuge, Texas

The report is available for $35 from the Captive Breeding Specialist Group, Species Survival Commission, IUCN—the World Conservation Union, 12101 Johnny Cake Ridge Road, Apple Valley, Minnesota 55124.

* * *

Region 3 - The FWS East Lansing, Michigan, Field Office met recently with the Michigan Department of Natural Resources to provide input to the State's lake sturgeon (*Acipenser fulvescens*) conservation plan. Before the plan is implemented, several issues need to be addressed, including stock translocation policy, egg viability studies, and the collecting and analyzing of contaminant data. A wildlife ecosystem risk assessment will also need to be developed. The FWS has considered the lake sturgeon a category 2 listing candidate since 1982.

* * *

The FWS Bloomington, Indiana, Field Office participated in developing a Memorandum of Understanding (MOU) for the construction of transportation projects within the karst region (a limestone region with sinkholes, underground streams, and caves) in the State of Indiana. This issue was prompted by potentially harmful impacts of highway construction on the environment of karst fauna, particularly the northern cavefish (*Amblyopsis spelaea*), a category 2 listing candidate. Signatories to the MOU are the Indiana Department of Transportation, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and FWS.

Under the MOU, all sinkholes, caves, underground streams, and other karst features in the area will be located, and surface and subsurface drainage patterns will be identified, prior to the design phase of any transportation project. The data will be used as a tool to plan project alignments that avoid as many karst features as possible. Any drainage directed to these features will be filtered using a variety of techniques currently being tested. Hazardous materials traps will be installed on all projects. Water quality entering a karst feature will be monitored and maintained at an established standard. Finally, strict erosion control specifications for the construction phase of each project will be established.

* * *

Researchers from the FWS National Fisheries Research Center in LaCrosse, Wisconsin, found many freshly-dead mussels buried under sand on the bottom and along the shoreline of the Mississippi

Fish and Wildlife Service photo

The Higgins' eye pearly mussel is one of several endangered mollusks affected by the 1993 midwest flood.

River near LaCrosse. Two Endangered Higgins' eye pearly mussels (*Lampsilis higginsi*) were among the dead found. It is possible the mussels were killed by massive sedimentation and substrate disturbance from the 1993 floods.

* * *

Region 4 - Biologists conducting a status survey of the flatwoods salamander (*Ambystoma cingulatum*) in Florida found only one population east of the Suwannee River. Although historical records for this listing candidate exist for 5 counties in northeast and north-central Florida, the Osceola National Forest was the only locality outside the Florida panhandle where the species was found during the survey. Biologists from the Florida Natural Areas Inventory observed flatwoods salamanders at 39 of 111 wetlands they examined. Using estimates of

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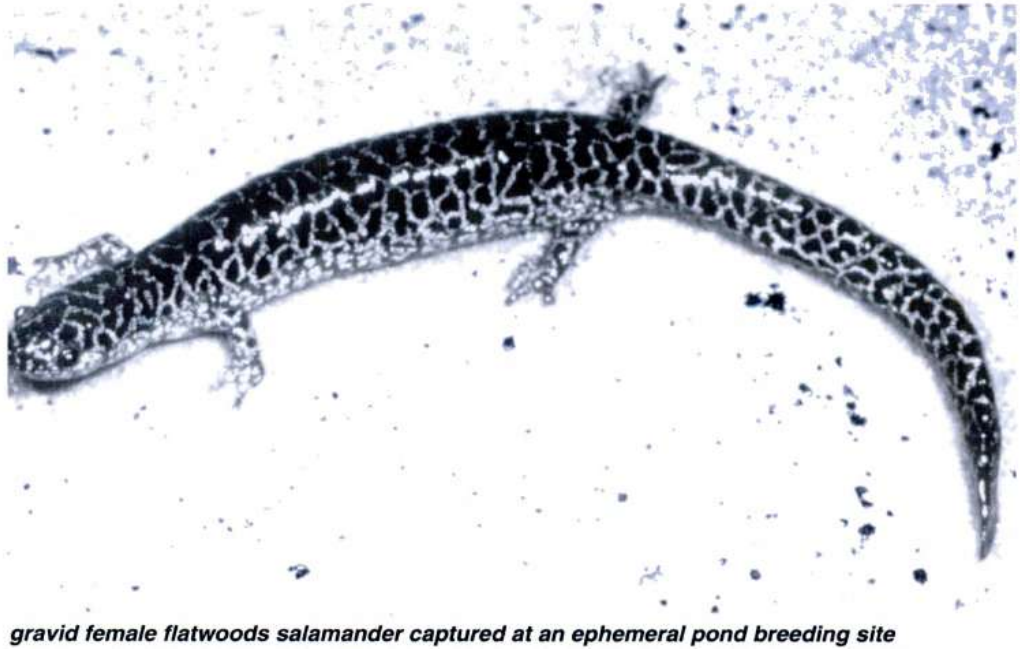

photo © John G. Palis

gravid female flatwoods salamander captured at an ephemeral pond breeding site

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potential migration distances from breeding ponds as a means of defining population limits, the survey verified the presence of 34 breeding populations.

Flatwoods salamanders historically occurred in low, wet, pine flatwoods and grass-dominated savannas of the southeastern coastal plain from Alabama to southern South Carolina. Rangewide status surveys continue. These surveys target breeding ponds because they represent discrete locations that can be sampled efficiently. The typical breeding pond in Florida was found to be a small, shallow, ephemeral pond with an open canopy composed primarily of pond cypress (*Taxodium ascendens*) and slash pine (*Pinus elliottii*), with an occasional blackgum (*Nyssa sylvatica* var. *biflora*). These ponds generally filled with water in late autumn or early winter, and began to dry in April and May with the onset of the growing season. Pond bottoms were firm and relatively devoid of leaf litter but covered by a combination of grasses, sedges, rushes, and herbaceous vegetation. Crawfish burrows were common, but large, predatory fish were absent due to the isolation and ephemeral nature of the ponds.

Threats to the salamander include habitat conversion for agriculture, silviculture, and real estate development; herbicide and fertilizer application; erosion resulting from road construction; and bait harvesting. The elimination of native ground cover vegetation and the ditching and draining of breeding ponds may have extirpated the flatwoods salamander from many private timberlands. Native ground cover has been eliminated by fire suppression and the resultant shrub invasion, the establishment of pine plantations with dense stocking rates and closed canopies, and soil alteration during mechanical site preparation.

* * *

Region 5 - Staff from the FWS regional and field offices are continuing their participation in the New England Plant Conservation Program (NEPCoP), a voluntary alliance of 68 private institutions and government agencies, organized in 1991 to promote the survival and recovery of New England's endangered flora. NEPCoP is a prototype for a nationwide tier of regional programs to bridge the gaps between national, State, and local plant protection programs.

With the goal of protecting plants and their natural habitats, NEPCoP aims to develop consistent approaches in different States regarding such issues as taxonomy, habitat management, status determinations, and reintroduction. A Regional Advisory Council, including FWS staff, oversees these policies and all regional elements. State task forces, the heart of the program, survey plant populations, suggest management strategies, and collect seed for banking and propagation.

The need for plant conservation on a national and regional level has been highlighted by the fact that about 50 percent of the species listed under the Endangered Species Act are plants. Of New England's 2,000 native plant species, about 500 may be in trouble. Because

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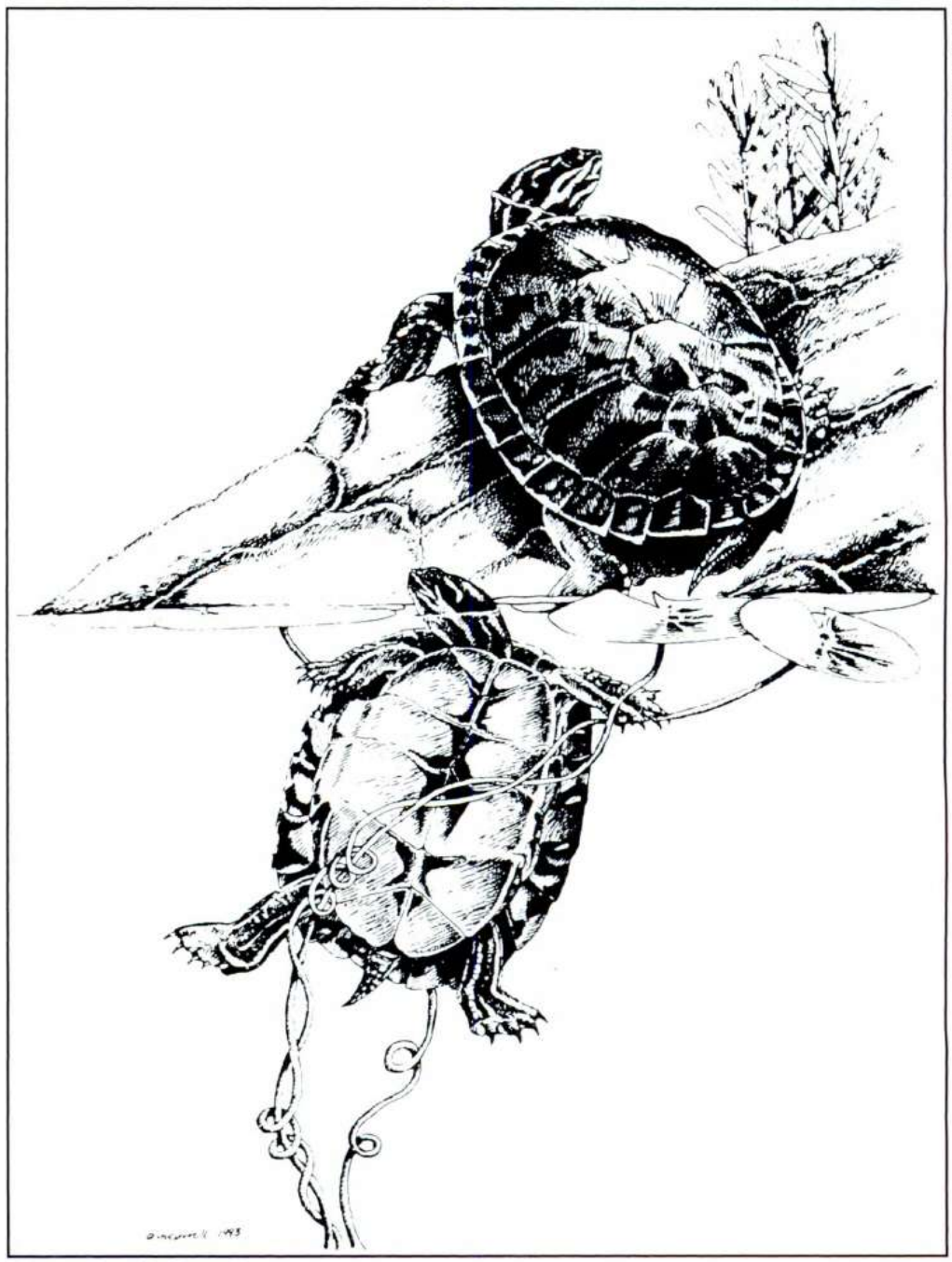

drawing by David Carroll

Plymouth redbelly turtles

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Forget that April 15 is Tax Day.

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Forget the summer of '42.

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So take a moment to tear out the response card provided below and indicate whether you wish to continue to receive the *Bulletin*. Also make desired changes to your mailing address. If the address is incorrect, print your correct address in the space provided on the card. Then return the postage-paid card no later than May 1, 1994. If it has not been received by that date, your name will be removed from the mailing list.

And then how would you know what was going on with the Peters Mountain mallow, the Kootenai River white sturgeon, the Last Chance townsendia, the spectacled eider...

Regional News

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listed plants on privately owned lands do not receive the same protection under the Act as listed animals, voluntary cooperation for plant protection is essential.

Public education will play an increasingly important role in enlisting voluntary cooperation for plant conservation. The New England Wild flower Society, an affiliate of NEPCoP, has begun a 10-year project to create the New England Garden of Rare and Endangered Plants at its botanical garden in Framingham, Massachusetts. In addition to providing the public an opportunity to see rare plants, the Society will begin an intensive education effort regarding habitat conservation and the importance of maintaining plant diversity. The FWS New England field offices anticipate assisting with this education and outreach effort.

* * *

The Plymouth redbelly turtle (*Pseudemys rubriventris*) was the first freshwater turtle in the United States

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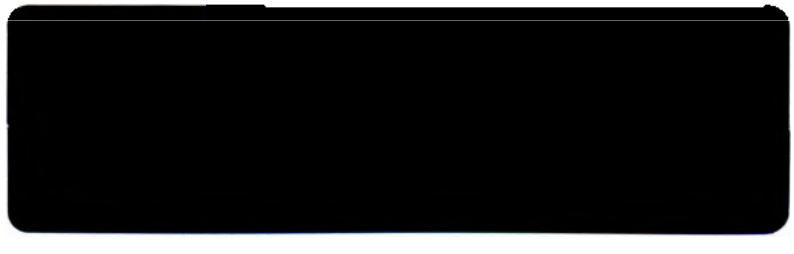

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listed as an Endangered species. Since its listing in April 1980, extensive research and recovery actions have greatly changed the status of the species, located only in Massachusetts. Once considered a separate subspecies (*P. r. bangsi*), the Plymouth redbelly is now regarded instead as a disjunct population, isolated by more than 250 miles from other redbelly turtles in seven coastal plain States to the south.

Measures being taken to increase hatching success include finding the nests and protecting them with wire screens. In 1993, Dr. Terry Graham (a professor who has been studying the Plymouth redbelly since 1969) and two Worcester State College biology students located and protected 71 redbelly nests. A total of 675 hatchlings emerged from the nests in August, September, and October. Dr. Graham and his students marked most of the hatchlings and released them into the nearest pond. Continuing a tradition begun in 1985, these recovery cooperators retained a number of hatchlings (153 in 1993), which they provided to a host of volunteer organizations for "head-starting" over the winter. The head-started turtles should grow rapidly and be less vulnerable to predation when they are released next June. Since 1985, 810 head-started hatchlings have been released into 16 Plymouth County ponds and one river. If these young turtles eventually enter the breeding population and nest successfully, the prognosis for recovery appears bright. A revised recovery plan will be available by spring 1994.

BOX SCORE
LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S.	ENDANGERED Foreign Only	THREATENED U.S.	THREATENED Foreign Only	LISTED SPECIES TOTAL	SPECIES WITH PLANS
Mammals	55	251	9	22	337	37
Birds	73	153	17	0	243	73
Reptiles	17	63	18	14	112	30
Amphibians	6	8	5	0	19	9
Fishes	61	11	39	0	111	62
Snails	12	1	7	0	20	26
Clams	50	2	6	0	58	40
Crustaceans	11	0	2	0	13	4
Insects	17	4	9	0	30	15
Arachnids	4	0	0	0	4	0
Plants	326	1	78	2	407	178
TOTAL	632	494	190	38	1,354*	474**

Total U.S. Endangered	632	(306 animals, 326 plants)
Total U.S. Threatened	190	(112 animals, 78 plants)
Total U.S. Listed	822	(418 animals, 404 plants)

* Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, chimpanzee, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

** There are 377 approved recovery plans. Some recovery plans cover more than one species, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of CITES Party Nations: 120

February 2, 1994

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ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

March/April 1994 Vol. XIX No. 2

ENDANGERED SPECIES

Technical Bulletin

U.S. Department of the Interior
Fish and Wildlife Service

Endangered Species Protection in the National Parks

by Napier Shelton

Congress established the National Park Service (NPS) in 1916 to conserve the natural and cultural resources in the national parks and similar areas, and to provide for public enjoyment of these areas in ways that leave them unimpaired for the enjoyment of future generations. Today, the 80-million-acre (34-million-hectare) National Park System encompasses more than 360 national parks, monuments, preserves, memorials, historic sites, recreational areas, seashores, and other units spread from Alaska to the U.S. Virgin Islands to American Samoa. In addition to preserving habitats that range from arctic tundra to tropical rainforest, the System protects representatives of more than half of North America's plant species and a large proportion of the continent's animal species.

The NPS has a long history of giving special attention to species in trouble. In the early decades of this century, Yellowstone National Park and several other western parks helped to build up depleted populations of such animals as the bison *(Bison bison)*, elk *(Cervus elaphus)*, and pronghorn *(Antilocapra americana)*. Protection of nesting and wintering trumpeter swans *(Olor buccinator)* at Yellowstone helped bring this species back from the edge of extinction. During the 1950's through the 1970's, the focus shifted to protecting and restoring gray wolves *(Canis lupus)* at Isle Royale National Park, grizzly bears *(Ursus arctos)* in Glacier and Yellowstone, and Hawaiian geese *(Nesochen sandvicensis)* at several of the Hawaiian parks.

With passage of the Endangered Species Act in 1973, the NPS intensified its efforts to inventory and protect Endangered species in the parks. Like all Federal agencies, the NPS is required by the Endangered Species Act to conserve Endangered and Threatened species and their Critical Habitats, and to avoid any actions that might jeopardize their survival. The NPS extends this responsibility to protecting Federal listing candidates and to State-listed and candidate species.

photo by Ted Simons

These red wolf pups were reared at Gulf Islands National Seashore in preparation for release at Great Smoky Mountains National Park.

Endangered species protection fits well with the NPS mission. Native ecosystems and natural processes in parks are preserved to the extent possible. Natural areas are managed to control the adverse effects of human influence, which are a factor in the declines of many listed species. The NPS is also working with other Federal, State, and local agencies to take whatever steps are available to minimize air and water pollution entering parks. Exotic, or non-native, species that are a clear threat to a park's native species are removed or suppressed wherever feasible.

Systemwide Inventory

The NPS initially focused its endangered species efforts on animals of special interest to the public in the parks, although many of the less conspicuous species, such as plants, clams, and fishes, also came under close scrutiny. However, in 1988, the NPS conducted a systemwide survey of Endangered and Threatened

(continued on page 14)

Regional News

Regional endangered species contacts have reported the following news:

Region 2 - Staff at the Aransas National Wildlife Refuge in Texas are considering live-trapping and relocating bobcats *(Felis rufus)* from the area where four whooping crane (*Grus americana*) chicks have disappeared. The recently discovered carcass of a juvenile crane produced the first confirmation of bobcat predation on the species at the refuge. The FWS biologists are continuing air and ground searches for the other young birds, which were reported missing in late November and early December.

Within a few days of the first disappearance, biologists recovered the remains of a juvenile crane in a pile with a great blue heron (*Ardea herodias*) and an American widgeon (*Anas americana*), surrounded by bobcat tracks. Necropsies of the crane and duck at the National Wildlife Health Research Center in Madison, Wisconsin, identified predation as the cause of death. The Center is investigating other factors — such as high lead levels, brain cholinesterase, or disease — that may have predisposed the juvenile to predation.

It is unusual to lose so many young birds. No sick or physically impaired whooping cranes have been noted on aerial surveys. Since the refuge territories from which the birds disappeared are not connected, a transmittable disease simultaneously affecting a large number of birds in different locations seems unlikely. Because juveniles stay with their parents until the spring migration in April, the missing birds are probably dead. The objective of relocating bobcats would be to remove animals experienced in killing whooping cranes, since juvenile birds are naive about predators and depend on the alertness of their parents. A factor contributing to the loss may be that juveniles are ranging farther from parents to find food. The months of drought preceding last December's rains dried up coastal marshes that provide important crane staples, including shellfish and other invertebrates.

The peak count of whooping cranes wintering on the refuge this year was 143, including 16 juveniles. Two families that arrived with one chick each had not been counted during the 1993 spring surveys, when 45 pairs — a record number — nested on the species' Canadian breeding grounds.

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Progress Toward Recovery Leads to Reclassification Proposal for Unique Virginia Tree

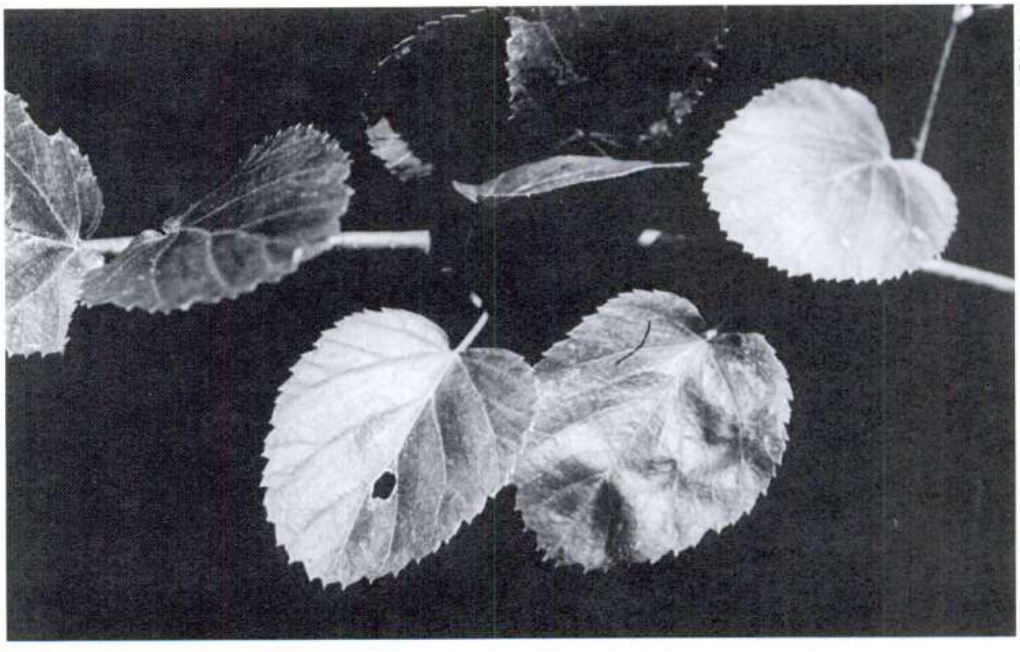

photo by F.G. Meyer

The Virginia round-leaf birch *(Betula uber)*, a species of tree endemic to the southwestern part of the State, has been listed since 1978 as an Endangered species. One natural population is known, and it numbers only 11 trees at last count. They are restricted to a narrow band of forest in the Cressy Creek floodplain, a site nearly surrounded by agricultural land. Since 1978, however, a cooperative recovery effort involving State and Federal agencies, arboreta, and private individuals has established 20 additional populations in the area. Several thousand seedlings also have been provided to botanical gardens and other institutions. Because the Virginia round-leaf birch is no longer believed to be in imminent danger of extinction, the Fish and Wildlife Service proposed December 6, 1993, to reclassify this species from Endangered to the less critical category of Threatened.

All 20 of the newly established populations, along with a portion of the single natural population, are on the Jefferson National Forest in the Mt. Rogers area. The U.S. Forest Service is actively involved in the management and protection of these trees. Additionally, the Forest Service provides a public information exhibit at the site of the largest round-leaf birch. A ramp allows visitors a close-up view of the tree, which is enclosed within a protective fence.

With the dramatic population increase of over 1,400 subadult trees at 20 sites, the outlook for the Virginia round-leaf birch has brightened considerably. But because of remaining threats from flooding, drought, competing vegetation, browsing animals, and vandalism, the species' future is not yet secure. The recovery program will continue until the round-leaf birch can safely be removed from Endangered Species Act protection.

Regional News

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Region 3 - Researchers from the Missouri Department of Conservation, the FWS, and other organizations spotted 1,707 bald eagles (*Haliaeetus leucocephalus*), 10 golden eagles (*Aquila chrysaetos*), and 7 unidentified eagles during the winter survey from January 3 to 7. At Eagle Bluffs, south of Columbia along the Missouri River in an area inundated during the 1993 flood, 42 eagles were standing on the ground around the edges of a "blue hole" created during the flood. Because no waterfowl or carrion were visible, the eagles were probably attracted to the site by fish trapped in the hole.

* * *

What do you do when 120,000 people are predicted to attend a fireworks show close to a building where nesting peregrine falcons (*Falco peregrinus*) are expecting young to hatch? If you are the FWS, the answer is to involve all interested parties, create public awareness, and develop a solution — in this case, an alternate fireworks display.

During the summer of 1993, a potential conflict between a July fireworks celebration in Cleveland, Ohio, and the needs of a pair of nesting peregrine falcons was resolved through cooperation among the FWS Reynoldsburg, Ohio, Field Office; the Ohio Division of Wildlife (DOW); management and marketing staff from Cleveland's Tower City Center (a metropolitan retail, office, and transit building); the fireworks company; the City of Cleveland; other private companies; and public citizens.

When it become evident that the celebration, scheduled for July 2, might directly harm the nesting raptors and interfere with the expected hatching of their young on July 4 atop the Tower City Center, team members took action. They created a public relations campaign and developed an alternate fireworks show, cancelling plans to cascade fireworks down the side of the building and moving the launch sites to protect the birds.

In the weeks before July 2, biologists from the FWS and Ohio DOW helped

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Building Economic Incentives into the Endangered Species Act

by Hank Fischer, Bill Snape, and Wendy Hudson

Editor's note: As part of our effort to cover independent views on the endangered species program, we are publishing the following article prepared by Defenders of Wildlife:

Ever since environmentalism became a household word in the 1970's, many conservationists and economists have maintained a healthy suspicion of one another. But America's patron saint of conservation, Aldo Leopold, rejected the notion that economists and ecologists should be at odds. In defining an environmental ethic for the country in his 1949 classic, *A Sand County Almanac*, Leopold offered this suggestion:

"Examine each question in terms of what is ethically and aesthetically right, as well as what is economically expedient. A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise."

It is noteworthy — and certainly not accidental — that Leopold included economic expediency as part of his environmental ethic. He recognized the limitations of government regulation in achieving environmental quality.

Conservation groups — including Defenders of Wildlife — have long supported a regulatory approach to the recovery of species on the brink of extinction. We have worked actively to establish effective recovery plans and to define scientifically supportable recovery standards. We have urged agencies to implement such plans and standards, and have filed lawsuits when we felt it necessary.

This regulatory approach to endangered species management has been largely successful on public lands, with modest impact on other land uses. As pointed out by a 1992 World Wildlife Fund study, of the approximately 74,000 endangered species consultations conducted by the U.S. Fish and Wildlife Service between 1987 and 1991, only 19 proposed developments or activities were blocked because of Endangered Species Act (Act) considerations.

This evocative poster, featuring the work of Montana artist Monte Dolack, was produced by Defenders of Wildlife to raise money for its Wolf Compensation Fund. The proceeds reimburse ranchers for livestock losses to wolves in the northern Rockies and the Southwest. Printed on museum-quality paper with fade-resistant ink, the highly-colored poster measures 23 by 32 inches. It can be purchased by writing Defenders of Wildlife, 1101 Fourteenth Street NW, Suite 1400, Washington, D.C. 20005, or by calling 202/682-9400.

It's undeniable that, in a handful of instances, endangered species conservation has had significant impact on other land uses, leading to what Secretary of the Interior Bruce Babbitt terms "train wrecks." But it's also irrefutable that, day in and day out, the Act continues to do what it does best: making development compatible with a diversity of life forms.

At the same time, the record of endangered species recovery on private lands points out the limitations of a strictly regulatory approach. Some Americans defend private property rights as vigorously as others champion the protection of endangered species. Progress with endangered species recovery on private lands will require approaches that do not constantly place these deeply held values at odds with one another.

A 1993 publication from the Natural Heritage Data Center Network pointed out how essential private lands are to endangered species conservation. It reported that approximately 50 percent of the 728 domestic species listed at the time were found exclusively on privately owned land. At least half the known occurrences of another 20 percent of the listed species were on private land. The conclusion is inescapable: no matter how well endangered species are protected on public land, we will fail in our efforts to conserve them unless we address endangered species management on private land.

Defenders of Wildlife first experimented with providing economic incentives to private landowners in the Northern Rockies in 1987 with a program that paid livestock producers at market value for all verified livestock losses to wolves. Since that time, Defenders' Wolf Compensation Fund has paid approximately $12,000 to about a dozen livestock producers.

According to Dr. Steve Fritts, U.S. Fish and Wildlife Service wolf recovery leader for the northwestern United States, "Defenders' compensation program has re-

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Economic Incentives

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duced animosity and made a major contribution to wolf recovery. For a relatively small cash outlay, it appears Defenders has increased cooperation and decreased the likelihood that wolves will be shot on sight."

In 1992, Defenders announced the initiation of a Wolf Reward Program that would pay $5,000 to any private landowner who had wild wolves breed and successfully rear their pups on private land. The first award from this program was made in February 1994 to a landowner along Montana's Rocky Mountain Front (the geographical area where the northern Great Plains meet the Rockies). It was the first record of wolves denning in this area in more than 50 years.

Defenders' experimentation with economic incentives has brought us into contact with many of the nation's leading economists and endangered species experts. The depth and diversity of interest in economic incentives has been impressive. We have been nothing short of excited by the volume and quality of innovative, incentive-based ideas.

Our enthusiasm for these new concepts has led us to share them with the public and Congress. In early 1993, Defenders contacted many of the nation's leading national experts and asked them to write papers on how to build economic incentives into the Act. Fourteen authors responded, including resource economists, environmental leaders, State and Federal endangered species biologists, developmental interests, a State wildlife agency director, and a U.S. Fish and Wildlife Service regional director. The resulting report, *Building Economic Incentives into the Endangered Species Act*, was published in October 1993. We believe it is the most exhaustive work on this subject published to date. Interest in the publication was so high we had to reprint it within 90 days.

Congress is paying close attention to the incentives discussion. Bills to reauthorized the Endangered species Act offered in the last session by Senator Max Baucus (D-MT) and Rep. Gerry Studds (D-MA) contain economic incentive provisions. According to Rep. Studds, "Endangered and threatened species do not recognize property boundaries. If we are going to be successful in bringing listed species back to health, we will clearly have to enlist the help of private landowners." Rep. Studds' bill (H.R. 2043) instructs the Secretaries of the Interior and Commerce to actively experiment with incentive approaches and report to Congress on the results. Such pilot projects provide the opportunity to test new methods without weakening existing regulatory protections.

Even the bills introduced by Rep. Billy Tauzin (D-LA) and Sen. Richard Shelby (D-AL), which contain elements opposed by many conservation groups, also contain interesting ideas for using incentives to protect endangered species. Both bills would allow private landowners who have species that are listed, proposed for listing, or candidates for listing proposals to submit conservation plans to Federal agencies. Upon approval, the cost of some private conservation activities could be reimbursed.

At the State level, California has been the trend-setter in examining incentive approaches. Conflicts between real estate interests and conservation of key habitats, such as coastal sage scrub, have intensified the need for finding solutions to the challenge of protecting endangered species on private land.

California is revising its own Endangered Species Act with an eye toward building economic incentives into the law. In late 1993, Gov. Pete Wilson hosted two roundtable discussions in California focused on improving both the State and Federal endangered species laws. Discussions about incentives dominated both meetings.

Defenders is working closely with a coalition of California conservation organizations called the California Biodiversity Alliance on incentives legislation. We believe California may provide a preview of how economic incentives can be incorporated in endangered species conservation.

Although it sometimes seems as if we have been debating endangered species issues forever, the current Federal law is a mere 20 years old. Society is only now taking its first steps toward devising a system that prevents the extinction of various life forms on earth. We are still investigating new techniques and exploring innovative approaches for making endangered species recovery more successful and more acceptable to all citizens.

Legal battles and confrontation dominated endangered species conservation during the first 20 years of the Endangered Species Act. The next major advances may come through incentives and cooperation.

Hank Fischer has been the Northern Rockies Representative for Defenders of Wildlife since 1977, and is the director of Defenders' economic incentives project. He has a long association with endangered species issues, particularly those involving wolves, grizzly bears, and black-footed ferrets. Bill Snape is Defenders' legal counsel on endangered species in Washington, D.C. Wendy Hudson is the coordinator for Defenders' watchable wildlife program in Portland, Oregon, and the editor of Building Economic Incentives into the Endangered Species Act.

The opinions expressed by the authors are not necessarily those of the U.S. Fish and Wildlife Service. Their article is part of an effort by the Bulletin to explore some of today's more challenging wildlife conservation issues by soliciting material representing independent viewpoints. If you would like to contribute by proposing an article, write the Editor, Endangered Species Technical Bulletin, U.S. Fish and Wildlife Service, 320 ARLSQ, Washington, D.C. 20240, or call 703/358-2166. See Bulletin Vol. XVIII, No. 4, for style guidelines, or request them from the Editor.

Defenders' special publication, *Building Economic Incentives into the Endangered Species Act,* is a 130-page report featuring papers from 14 of the nation's leading endangered species experts. To order, send $10 (shipping and handling included) to Defenders of Wildlife, Northwest Regional Office, 1637 Laurel Street, Lake Oswego, Oregon 97034. For more information, call Hank Fischer at (406) 549-0761 or Wendy Hudson at (503) 697-3222.

The Peregrine Fund: Giving Wing to Recovery

by William A. Burnham and Jeff Cilek

Editor's note: Restoring a rare species is seldom an easy or straightforward task. Government agencies cannot do the job alone; the assistance of the private sector is often crucial for recovery to succeed. To help illustrate this point, we asked The Peregrine Fund — an organization that has worked extensively with the Fish and Wildlife Service — to provide an article on its activities to recover endangered birds.

The Peregrine Fund (Fund), a nonprofit conservation organization, was founded in 1970 at Cornell University by then Professor of Ornithology Tom J. Cade to conserve birds of prey. The Fund has cooperated on projects in over 35 countries on 5 continents. Our biologists have participated in efforts to restore the peregrine falcon (*Falco peregrinus*), Mauritius kestrel (*Falco punctatus*), northern aplomado falcon (*Falco femoralis septentrionalis*), bald eagle (*Haliaeetus leucocephalus*), 'alala or Hawaiian crow (*Corvus hawaiiensis*), and California condor (*Gymnogyps californianus*). In all, the Fund has hatched and reared over 4,000 individuals of 22 raptor species, reintroduced 9 species, and conducted research on over 60 species.

Although the Fund's primary focus has been on raptors, we have also conducted research and conservation projects for neotropical migrant and resident songbirds, shrikes, and other non-raptor bird species. The World Center for Birds of Prey, established in 1984 in Boise, Idaho, is the headquarters for the Fund's global research, conservation, and education programs. It also shelters one of the largest collections of endangered birds of prey — more than 200 individuals representing over 10 different species.

The Fund also has a very active public education program, and we anticipate over 50,000 visitors a year at our new Velma Morrison Interpretive Center. Student education is supported through research opportunities and scholarships. The Fund helped establish a masters degree program in raptor biology at Boise State University, the only such degree program in the world. Over 100 conservationists from throughout the world annually receive training from the Fund.

Peregrine Falcon

Many naturalists would argue that the peregrine falcon is the most dynamic of raptors, with tremendous dives of 200 miles per hour and an impressive defense of its home and young. The declining populations of this charismatic species led to the foundation of the Fund. At that time, breeding peregrines were extirpated east of the Mississippi River and the population had diminished by 80 to 90 percent in the West. Since then, with the cooperation of others, we have released over 3,700 peregrines in 28 States.

The peregrine falcon is making a good recovery, with about 100 pairs known in the eastern United States, 57 pairs known in the Midwest, over 100 known pairs in California, about 100 pairs in the Northwest (Idaho, Washington, Oregon, Montana, and Wyoming), and over 170 pairs known in Colorado and Utah. Additional releases are planned in Idaho, Oregon, Montana, Washington, and Wyoming for 1994 and 1995.

California Condor

California condors, with their wingspans of over 9 feet, are among our continent's most impressive birds. Ten thousand years ago, this species soared over much of North America. However, as the large, ice age mammals gradually became extinct, the California condor's food supply also declined. The birds eventually were restricted to areas along the Pacific Coast, where their diet included beached whales and seals. Shooting, poisoning, and loss of habitat decimated the condor population, which reached a low point of 22 individuals in 1983. *(Editor's note: the population has since been increased to 75 birds, including 66 in captive breeding flocks and 9 that have been released into the wild.)*

In November of 1992, at the recommendation of the California Condor Recovery Team, the Fish and Wildlife Service (FWS) selected the Fund's World Center for Birds of Prey as the site for the third California condor breeding facility. The other two facilities are located at the Los Angeles Zoo and the San Diego Wild Animal Park. Construction of the new Peter and Conni Pfendler California Condor Breeding Facility was completed last summer, and six pairs of condors arrived from the Los Angeles Zoo and the San Diego Wild Animal Park on September 23, 1993. (See *Bulletin Vol. XVIII, No. 4.*)

Young California condors raised at the World Center may someday be released in the Grand Canyon of Arizona, providing spectacular opportunities to view the largest bird in North America.

Aplomado Falcon

When Spanish explorers came to the grasslands of Texas, Arizona, and New Mexico, the aplomado falcon was part of the landscape. It perched atop yuccas and in the crowns of scattered trees that rose from the green and yellow prairies. The falcons sped on flashing blue-grey wings to chase the abundant birds thriving in the seed-grasses that brushed the bellies of the Spanish horses.

Unfortunately, the aplomado falcon population declined drastically by the early 1940's. The major cause appeared to be the loss of native grasslands resulting from changing land uses. Between 1977 and 1988, the Fund and cooperators were able to obtain permission from the Mexican government to collect aplomado falcon nestlings in southern Mexico for captive propagation. At the

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A Successful Year in the Recovery of the Aplomado Falcon

by Chris Perez and Phil Zwank

For the effort to recover the northern aplomado falcon *(Falco femoralis septentrionalis)*, a bird of prey classified as Endangered, 1993 was a banner year. From June through August, 26 young birds were released on the Laguna Atascosa National Wildlife Refuge in southern Texas. This single year's record exceeded the total of 24 falcons previously released since the program began in 1985.

Laguna Atascosa was chosen because of its proximity to remnant aplomado falcon populations in Mexico. In addition, much of the refuge's 45,000 protected acres (18,200 hectares) is coastal prairie, which is similar to the native habitat the birds historically occupied in southern Texas.

The released aplomado falcons were young-of-the-year progeny of a captive flock maintained by The Peregrine Fund, a private conservation organization. When nestlings reached approximately 29 days of age, they were flown to the refuge and released through a process known as hacking. This technique, which has worked so successfully in peregrine falcon restoration, includes providing food and protection until young birds fledge and become independent. At the refuge, young birds were first placed in a large wooden box atop a 10-foot (3-meter) tower at one of two hack locations. After a week in the hack box, tarsal-mounted transmitters were attached to each bird and they were set free. While the released falcons became familiar with their surroundings, volunteers watched their progress from a blind near the hack tower and monitored their movements with radio telemetric receivers. Food was brought to the hack box until the young birds no longer returned.

In previous aplomado falcon releases, monitoring ended when released birds left the hack site or transmitters stopped functioning. This usually occurred within one month after release. This year, however, fledglings were recaptured after about 3 weeks and tarsal-mounted transmitters were replaced by tail-mounted transmitters with a battery life of about 6 months. These birds were monitored by staff of the New Mexico Cooperative Fish and Wildlife Research Unit, with funding from the FWS Corpus Christi, Texas, Ecological Services Field Office, Laguna Atascosa National Wildlife Refuge, and The Peregine Fund.

Radio telemetry has provided data on survival, dispersal distances and direction, and the structural characteristics of habitats in which the birds chose to settle. Many of the released falcons have established residence on or near the refuge. Most are in coastal prairie along the refuge's western boundary.

It is not certain exactly how many of the released birds are still alive. We do know, however, that there have only been four confirmed mortalities. Coyotes and owls are suspected, but determining conclusively what caused the deaths is almost impossible.

In spite of the mortalities, we view the 1993 releases as a success. It remains to be seen, however, if these released birds will achieve the long-term goal of establishing a self-sustaining breeding population.

photo by Steve Bentsen

Aplomado falcon

Chris Perez is with the New Mexico Cooperative Fish and Wildlife Research Unit, and Dr. Zwank is Unit Leader.

Giving Wing to Recovery

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request of the FWS, the Fund has taken a leadership role in the species' restoration, and a captive breeding population has been established at the World Center for Birds of Prey.

The Laguna Atascosa National Wildlife Refuge, located near the southernmost part of Texas, was selected as the place in which to begin the restoration effort. However, the cooperation of ranchers to conserve the species on private lands will be important to ultimate success. One of the last known nesting sites of the aplomado falcon in the U.S. was near the wildlife refuge in the 1940's.

Twenty-six captive bred aplomado falcons were released the summer of 1993. (See accompanying article.) In 1994, we hope to release 30 to 35 more falcons at three sites on the refuge and one nearby site on private land. Long-term plans call for releasing 50 aplomado falcons a year for 10 to 15 years, moving westward from Texas into New Mexico, Arizona, and adjacent areas in Mexico.

Hawaiian Crow

The Hawaiian Islands are known as "the endangered species capital of the nation." They have more endangered and threatened plants and animals than any other State, and are home to 19 species of endangered forest birds.

One of these species is the 'alala or Hawaiian crow, of which only 12 wild and 11 captive individuals were known to exist in late 1992. That November, when the FWS asked the Fund to join the 'alala recovery program, we assembled a team of experts to assist. The Zoological Society of San Diego provided for the incubation of 'alala eggs collected from the wild and the rearing of young. Greenfalk Consultants undertook surrogate research on non-threatened corvid species in Idaho. The Fund coordinated these activities and accomplished the release of captive-hatched 'alala into the wild. Biologists with the FWS monitored the wild 'alala and managed the overall program. Because the birds occur on private property, the participation of landowners has been critical.

Through these efforts, eight first-clutch eggs were gathered from three wild pairs of 'alala nesting on private ranches. From these eight eggs, six young were hatched and reared in captivity. Five of the young were released to the wild, while the other was sent to enhance the captive flock at the State's endangered species propagation facility at Olinda, Maui. In addition, two of the three wild pairs renested and hatched young. For unknown reasons, both pairs failed when their young were about two weeks old. One pair renested for a third time, and three eggs were removed after the adults abandoned the nest. Only one egg was fertile and hatched, and the young was later sent to the Olinda facility.

Five captive-hatched young were released into the wild in August 1993. (See *Bulletin Vol. XVIII, No. 3.)* Food was provided at the release aviary until late 1993, when the birds were fully independent of human care, successfully foraging for food, and evading predators.

As a result of this success and the extreme needs facing native Hawaiian forest birds, the FWS, State of Hawaii, and others have requested that the Fund cooperatively develop and operate a facility for the 'alala and other endangered birds on the Island of Hawai'i. Construction will begin in 1994.

Harpy Eagle

The harpy eagle (*Harpia harpyja*) is usually considered the world's most powerful eagle, and it is certainly one of the largest. Its talon is similar in size to the claw of a tiger. Harpy eagles occur in lowland tropical forest environments from Mexico to Argentina. As forest habitats have been altered, the species has greatly declined in Mexico and Central America, and populations are falling in South America as well.

We aim to conserve the harpy eagle and its tropical forest environments by (1) working cooperatively with Latin American governments, organizations, and local people, and (2) by using the Gerald D. and Kathyryn Swim Herrick Tropical Raptor Building to develop captive breeding and release techniques to reestablish the eagle where suitable habitat remains. In the past 2 years, we have investigated the distribution of harpy eagles and their use of habitat in different geographical areas, locating 14 nests. We also examined human-caused mortality. Shooting and habitat destruction are now major problems for this species.

In cooperation with NASA and David Ellis of the FWS, we began following the dispersal of five juvenile harpy eagles in Venezuela, with satellites reading signals from radio transmitters carried by the birds. We are also expanding this cooperative effort to the Darien National Park of Panama. On a roughly monthly basis, we acquire activity data on these young birds from NASA tracking stations. We found that harpy eagles may have the longest rearing period among raptors. For more than a year after they are capable of flight, the fledglings stay within a small area near their nests and rely on their parents for food.

We had the opportunity to rescue juvenile eagles that had been removed from their nests and to salvage birds wounded by shooters. In Venezuela, we enlisted the help of loggers to successfully release a young eaglet whose nest they had destroyed to build a new road, and we were able to keep the bird in its original habitat until it was old enough to become self-supporting. Through cooperation with Latin American governments, six non-releasable birds have been loaned to our captive breeding center in Boise.

The Maya Project

The Maya Project, initiated in 1987, uses birds as an environmental focus for sustaining tropical forests and building local support for conservation. The 2.2 million-hectare project area in the contiguous border parks of Guatemala, Mexico, and Belize is one of the most important biotic reserves in Latin

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Giving Wing to Recovery

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America. Its ecologically diverse forests are critical for the conservation of native and migrant bird species. Our activities directly contribute to management and monitoring of the biological diversity in this large, mostly undeveloped area.

The predominant factor affecting viability of raptors is habitat alteration resulting from rapidly increasing human populations and a growing demand for fuel, fiber, food, and minerals. Survival of most wildlife will depend on its ability to adapt to highly modified environments or on our capacity to establish and maintain preserves of sufficient size and quality. The Maya Project is designed to yield information needed to address those problems.

The study uses raptors as indicators of the nature, complexity, and health of the entire ecosystem. Because many tropical forest raptors require a large undisturbed area to survive, their conservation provides an "umbrella of protection" for the entire ecosystem, helping to conserve other species of the forest.

In addition, the Maya Project studies neotropical songbirds — species that breed in the U.S. and Canada, and migrate south to winter in Latin America and the Caribbean. The past decade has witnessed growing concern for the well-being of neotropical songbirds. Many, if not most, of these species spend more time in the tropics than they do in their temperate breeding haunts. During the 1991 and 1992 field seasons, the Fund began a major new segment of the Maya Project—a large research effort designed to provide new information on the ecology and conservation needs of neotropical migrant songbirds in the three-nation project area. This constitutes the first detailed look at the importance of the Maya Biosphere Reserve as a wintering area for neotropical migrants.

In the Maya Project, members of the Fund work with Latin American field researchers, trainees, and graduate students. Since the program began, more than 115 Latin American colleagues have received informal training, with some receiving even more years of involvement in field work. In addition, the Maya Project sponsors formal education. As a result, 18 Latin Americans administer the project and are heading research/conservation teams.

* * *

More and more we are separated from our natural world. But knowledge about nature helps people understand their relationship with the environment. Learning more about birds of prey enhances that understanding. The benefit we receive from the wild beauty of an eagle's flight, a falcon's dive, or the majestic soaring of a condor cannot be measured. Still, nature's inspiration and beauty help fuel the human spirit.

William Burnham is President of The Peregrine Fund and Jeff Cilek is Program Executive. For more information, write Mr. Cilek at The Peregrine Fund, Inc., World Center for Birds of Prey, 5666 West Flying Hawk Lane, Boise, Idaho 83709.

Final Rules

Final rules issued under the Endangered Species Act to reclassify one plant species and list two fishes as Endangered were published in December 1993:

Siler Pincushion Cactus *(Pediocactus sileri)*

A small globose or cylindrical cactus, this species has spines with black/purple tips when young and produces yellow flowers in the spring. It is endemic to parts of northwestern Arizona and southwestern Utah, where it occurs primarily on public lands administered by the Bureau of Land Management (BLM). The Siler pincushion was listed in 1979 as Endangered because of threats posed by livestock grazing, off-road vehicles, mining, road construction, and illegal collecting to the small number of known plants.

Recovery actions carried out in recent years by the BLM include developing a habitat management plan and conducting surveys for other populations. As a result, the status of the Siler pincushion has improved, although it is not yet secure enough to remove from protection under the Act. In recognition of the progress made toward full recovery, the Fish and Wildlife Service reclassified the Siler pincushion on December 27 from Endangered to the less critical category of Threatened.

Two Freshwater Fishes

Two species of freshwater fishes with restricted ranges were listed December 27 as Endangered:

- **relict darter** ***(Etheostoma chienense)*** - a small fish endemic to the Bayou du Chien drainage in western Kentucky.
- **bluemask darter** ***(Etheostoma* sp.)** - a smaller fish distinguished by the bright blue color displayed in breeding males. This taxon, for which a formal species description is being prepared, is endemic to the Caney Fork River system in central Tennessee.

Both darters are threatened by water quality degradation from a number of sources, including coal mining, gravel mining, and siltation caused by poor land use practices. Habitat has also been altered by impoundments and stream channelization.

Making the Best of Mother Nature: Managing the Puerto Rican Parrot After Hurricane Hugo

by Francisco J. Vilella and Ana B. Arnizaut

The Puerto Rican parrot (*Amazona vittata*) was once extremely abundant and widely distributed throughout Puerto Rico and its satellite islands. During the late 1800's and early 1900's, however, large scale deforestation eliminated most of the habitat upon which this species depends. By 1940, the parrot population had declined to about 2,000 individuals (Rodriguez-Vidal 1959), and was restricted to the rainforests of the Luquillo Mountains on northeastern Puerto Rico, mainly the area encompassed by the Caribbean National Forest.

Efforts to conserve the Puerto Rican parrot began in 1968 when a relict population of 23-24 birds was found in the upper elevations of the national forest. By August 1989, there were 45-47 parrots in the wild and 53 at the aviary in Luquillo. On September 18, 1989, however, Hurricane Hugo struck with sustained winds in excess of 150 miles per hour. Damage to parrot habitat was extensive.

Since 1990, both the Fish and Wildlife Service (FWS) and the Forest Service have been dedicated to restoring the wild population. After the storm, parrot surveys were conducted using canopy-level platforms. The network of canopy platforms has increased from fewer than 10 in 1988 to 40 in 1993. Parrot numbers also have grown consistently since the passage of Hugo. By September 1993, the wild population stood at 41 birds, or 91 percent of the pre-hurricane level.

Habitat and Population Management in the Wild

Puerto Rican parrots nest in tree cavities, and studies have suggested that the availability of suitable cavities may be one of the main factors limiting the species' recovery (Snyder et al., 1987). Since 1990, 47 cavities in palo colorado (*Cyrilla racemiflora*) trees have been enhanced by Forest Service and FWS personnel. Cavities selected for this treatment were within or adjacent to active nesting territories and within areas where non-breeding pairs were observed searching for nest sites.

All of these cavities were initially unsuitable for parrot nests due to such characteristics as inappropriate cavity depths (too deep or too shallow), excess humidity, and inaccessibility to the cavity interior. Each cavity was evaluated and "improved" as needed to match the characteristics of the natural cavities used by nesting parrots (Snyder et al., 1987). Cavities were modified to suitable dimensions and drainage was provided for nest bottoms. Access doors were constructed to allow the inspection of cavity contents. The last additions were visors to divert rainwater, a perching vine, and camouflaging vegetation. These cavity improvements have contributed significantly to parrot recovery efforts since Hurricane Hugo struck the island.

Since 1991, 6 Puerto Rican parrot pairs have nested in the wild each year, the highest number since a study conducted in the 1950's (Rodriguez-Vidal 1959). It has been suggested that the recent record years were due to the environmental effects of Hurricane Hugo (Meyers et al., 1993). Now, we believe the fact that all parrot pairs have been successful and highly productive since 1991 may be due to several additional factors: (1) the composition of the surviving population, (2) the availability of improved natural cavities, and (3) the effectiveness of the nest management program.

During the 1993 breeding season, a potential seventh pair inspected another improved cavity in a palo colorado tree. Additionally, parrots are nesting in areas at lower elevations and using cavities in tree species such as tabonuco (*Dacryodes excelsa*) that previously were not known to provide nest sites. However, these new breeding areas were sporadically visited by parrots before Hurricane Hugo and, consequently, before the cavity improvement program.

All of these new breeders are banded birds, and some even wear transmitters from a study conducted in the late 1980's. One transmitter was recovered from the base of a tabonuco cavity in 1992. This bird, a male, was found to have hatched in 1986 in the eastern section of the forest. It was recruited into the breeding population before its fifth year and was nesting less than a mile from where it fledged.

A number of the methods used to manage parrot nests were modified after Hurricane Hugo. One improvement was to better camouflage the nest observation blinds and equip them with large windows of one-way glass. Microphone systems placed inside the nests to monitor activities of the adults as well as their brood have been improved. Also, a commercial wood chipper is providing fresh nesting material, which is being used to reduce the humidity of parrot nests. High humidity can lead to hatching failure due to poor embryonic development or pathogenic microorganisms (e.g., *Aspergillus flavus*). Most important, nest guarding efforts are being allocated by addressing the particular needs of each breeding pair, rather than by trying to cover every nest every day.

The guarding of parrot nests — which includes monitoring of nesting behavior — has been employed as a management strategy for more than 20 years. It is used to detect potential problems and to schedule nest inspections and manipulations. Although some studies have argued that nest guarding should be

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Puerto Rican Parrot

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maximized to improve nesting success (Lindsey 1992), our data for the last 18 nests in 1991-1993 suggest that the intensity of these efforts is not necessarily directly proportional to nesting success. Six parrot nests during 1992-1993 were guarded 36 percent of the time, compared to 4 nests guarded 92 percent of the time before Hurricane Hugo (1987-1988). Nesting success was 100 percent for both post-hurricane years and 26 chicks were produced, more than twice the number produced before the storm. This suggests that increased nesting success and productivity can be achieved with a program that is smaller, yet better allocated and more cost effective.

Nest manipulations such as cross-fostering (where chicks from the aviary are placed into nests in the wild, and vice versa) are conducted during the brooding phase. The temporary placement of captive produced surrogate Hispaniolan parrot (*Amazona ventralis*) chicks in Puerto Rican parrot nests has been successful in reducing chick mortality and increasing nest success. The Hispaniolan parrot chicks take the place of the native parrot chicks until problems at the nest can be resolved and the young Puerto Rican parrots can be returned to their parents or fostered into another nest. Management of Puerto Rican parrot nests has been instrumental in mitigating problems that could have led to nest losses, such as the swarming of nest cavities by honeybees (*Apis mellifera*) and predation of parrot eggs and chicks by the pearly-eyed thrasher (*Margarops fuscatus*).

In 1993, the 6 wild breeding pairs of Puerto Rican parrots produced 13 chicks. One of these young birds was removed from the wild to increase genetic representation in the captive breeding flock, which is maintained at the Luquillo aviary. On the other hand, three chicks from the captive-breeding flock were placed into nests in the national forest. As a result, the 6 wild pairs fledged an all-time record of 15 chicks in the wild.

Managing the Captive Population

Captive propagation efforts for the Puerto Rican parrot began in 1972. This part of the recovery project has been expensive and slow, but a series of modifications to the management program and the aviary facilities were initiated in January 1992.

Information from a population genetics study (Brock and White 1992) helps guide managers in the optimal pairings of Puerto Rican parrots. A pair-bonding cage is used to assemble the targeted breeding pairs. In 1993, 13 genetically and behaviorally compatible pairs were set up for captive breeding. Out of these 13 pairs, 11 laid eggs, 9 laid *fertile* eggs, and 5 produced a total of 10 young parrots. Nine of the 10 young survived, an all-time record for the Luquillo aviary. Three of the nine parrot chicks produced at the aviary were fostered into nests in the national forest to join the wild population.

For the first time, captive breeding pairs at the aviary were supplied with a nest structure made of PVC material. These artificial nests are reusable and help to keep nesting females in a drier, more sterile environment. The nest entrance, the only part extending into the breeding cage, is covered with a "cap" carved out of coconut palm (*Cocos nucifera*), Also, breeding pairs were monitored by closed-circuit television, which allowed keepers to observe the parrots' breeding behavior while reducing disturbance. Nutritional and microbiology studies of both wild and captive parrots also are in progress.

Most important, during 1993, 6 pairs of captive Puerto Rican parrots were transferred to the Rio Abajo aviary — managed by the Puerto Rico Department of Natural Resources — to initiate a second captive breeding population.

A Challenging Future

The wild population has been increasing since 1991 at a rate of approximately 5 birds per year, about twice the growth rate during the pre-hurricane years of 1975 to 1989. We are extremely encouraged to see such a high rate of productivity just 4 years after the storm. The 22 chicks produced in 1993 by both wild and captive populations stand as evidence of the opportunities for recovery. But although the parrot population in the wild has demonstrated a high degree of resilience, it would be extremely difficult to restore from captive-produced birds alone if lost. Hurricanes are a fact of life in the West Indies, and we must strive to increase the abundance and distribution of the wild parrot population before the next storm arrives.

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Listing Proposals — December 1993/January 1994

Nine species — four animals and five plants — were proposed by the Fish and Wildlife Service during December 1993 and January 1994 for listing as Threatened or Endangered. If the listing proposals are approved, Endangered Species Act protection will extended to the following:

Two Puerto Rican Hawks

Two rare subspecies of hawks endemic to mountain forests on the island of Puerto Rico were proposed January 3 for listing as Endangered:

- **Puerto Rican broad-winged hawk** ***(Buteo platypterus brunnescens)*** — a small brown hawk with a black-and-white banded tail and rufous breast. An estimated population of only 124 birds is restricted to 3 areas: the Caribbean National Forest and the Río Abajo and Carite Commonwealth Forests.
- **Puerto Rican sharp-shinned hawk** ***(Accipiter striatus venator)*** —another small hawk with a dark gray upper body and heavily barred rufous underparts. A total population of about 155 birds is believed to remain in five forests: the Caribbean National Forest and the Maricao, Toro Negro, Guilarte, and Carite Commonwealth Forests.

The patchy distribution and low numbers of both hawks may be the result of the widespread deforestation that took place in Puerto Rico during the first half of this century. Despite the growth of secondary forests in recent decades, the hawks have not been observed in any of these areas. The birds are restricted to the remnants of mature montane forests that escaped the earlier logging. Any further logging or management practices that would diminish the quality of the remaining mature forests could jeopardize the hawks.

Other threats to the hawks include road construction connected with logging or recreation, human disturbance, and the danger of habitat damage from hurricanes. Additionally, biologists have documented the deaths of sharp-shinned hawk nestlings to parasitism by the warble fly *(Philornis* spp.*)*. One study attributed approximately 60 percent of nestling mortality in the Maricao forest to the fly.

Three Puerto Rican Plants

Many of Puerto Rico's native plants also are vulnerable. Three species were proposed January 3 for listing as Endangered. Their limited range and numbers put these plants in danger of extinction:

- ***Eugenia woodburyi*** — a small evergreen tree in the myrtle family (Myrtaceae). Only 45 individuals are known from 3 areas.
- ***Mitracarpus maxwelliae*** — a low, densely-branching, moundlike shrub in the coffee family (Rubiaceae). Just over 1,400 plants are found at a single site.
- ***Mitracarpus polycladus*** — a related perennial that branches from the base to form erect or spreading stems. This species occurs at two locations, one on Puerto Rico and the other on the island of Saba in the Lesser Antilles. Its numbers are difficult to estimate due to extreme drought conditions in recent years.

Except for *M. polycladus*, all populations of these species are restricted to semi-arid habitat found in the extreme southwestern portion of Puerto Rico. Privately owned land in this region is subject to intense pressure for agricultural and tourism development. Populations of all three taxa are also found within Guánica Commonwealth Forest, but both *Mitracarpus* species grow along infrequently used roads and could be vulnerable to increased traffic or road widening in the future. The sites are near areas that experience heavy recreational use.

photo by James W. Wiley

Puerto Rican broad-winged hawk

Sacramento Splittail (*Pogonichthys macrolepidotus*)

Widescale habitat degradation led the FWS to propose listing the Sacramento splittail, a primarily freshwater fish native to California's Central Valley, on January 6 as a Threatened species. A relatively large fish, the splittail can exceed 40 centimeters (16 inches) in length. It is characterized by an elongated body, distinct hump, and small, blunt head with barbels at the corners of the mouth.

Historically, Sacramento splittail were distributed throughout the waters of the Central Valley, as far north as Redding on

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Listing Proposals

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the Sacramento River and as far south as the present-day site of the Friant Dam on the San Joaquin River near Fresno. Recreational anglers reported catches of 50 or more splittail per day prior to the damming of these and other rivers. The fish was once part of the diet of Native Americans living in the valley.

Today, the Sacramento splittail no longer survives in most of its historical range. It declined as rivers were dammed, water was diverted for agriculture, spawning and nursery habitat was diked and drained, the water became polluted, nonnative aquatic animals were established, and all of these factors were exacerbated by drought.

Splittail, which can tolerate some salinity, now are restricted to the Suisun Bay, Suisun Marsh, Napa Marsh, and the San Francisco Bay/Sacramento-San Joaquin Estuary. Even within this reduced range, the species' numbers have fallen more than 60 percent since 1984. Most of the problems that led to the original decline — especially freshwater diversions and increased water pollution from agricultural runoff, municipal effluents, and industrial chemicals — threaten the remaining populations.

photo © Nora Murdock

These dead Fraser firs are all that is left of a once productive forest on Roan Mountain, North Carolina. Acid precipitation and an introduced insect are believed to be the main causes for the decline of such conifir stands in the southern Appalachians. Forests like this provided habitat for the spruce-fir moss spider and the rock gnome lichen.

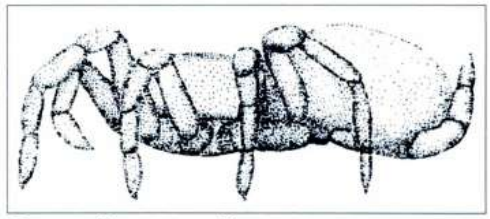
Spruce-fir Moss Spider *(Microhexura montivaga)*

Also endangered by habitat degradation is the spruce-fir moss spider. This small arachnid is known only from a few sites in the southern Appalachian Mountains where — as its name implies — it inhabits mature spruce-fir forest communities. These forests are deteriorating rapidly due to air pollution and the infestations of an exotic insect.

The spruce-fir moss spider has a specialized habitat: moist but well-drained moss mats growing on rocks and boulders in well-shaded locations within high-elevation conifer forests dominated by red spruce *(Picea rubens)* and Fraser fir *(Abies fraseri)*, a tree that itself is a candidate for listing. The spider requires situations of high, constant humidity. Unfortunately, these conditions are changing as the forests decline.

Significant amounts of the high-elevation conifer forests in the southern Appalachians appear to be dying. At one site where the spider is apparently extirpated, the red spruce have lost up to 90 percent of their foliage, possibly due to acid precipitation. Also, spruce-fir forests within the spider's range have been decimated by the balsam wooly adelgid *(Adelges picea)*, a pest insect introduced from Europe. The death and thinning of the forest canopy produces drastic changes in associated microclimates, including increased temperatures and decreased moisture. As a result, the moss mats become desiccated and cannot support the spider, and possibly its prey.

Four populations of the spruce-fir moss spider are known to remain. Three are within Great Smoky Mountains National Park near the Tennessee/North Carolina border, but they are very small. The only population considered viable is on private property in Avery and Caldwell Counties, North Carolina, and the landowner has expressed support for the proposed listing. Due to the species' precarious status, the FWS proposed January 27 to list the spruce-fir moss spider as Endangered.



Spruce-fir moss spider

Rock Gnome Lichen *(Gymnoderma lineare)*

Another sign that the high-elevation forests of the southern Appalachians are in trouble is the decline of the rock gnome lichen, a low-growing plant in the reindeer moss family (Cladoniaceae). This species occurs in North Carolina and Tennessee, and grows only in areas of high humidity — usually at high elevations, where the habitat is frequently bathed in fog, but also in deep gorges at lower elevations. Within these areas, it is limited primarily to intermittent seeps on rock outcrops and cliffs within forests dominated by red spruce and Fraser fir.

Like the spruce-fir moss spider, the rock gnome lichen declined as air pollution and exotic insects took their toll on the region's forests. Habitat became desiccated as the forest canopy thinned. In addition, lichens generally are very sensi-

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tive to a wide range of air pollutants. Only 32 populations of the rock gnome lichen remain, and most occupy less than 1 square meter. Four of the populations contain 75 percent of the existing plants, and 3 sites are on land administered by the National Park Service and U.S. Forest Service that are subject to heavy recreational use. This disturbance is adding to the other problems facing the species. Accordingly, the FWS proposed December 28 to list the rock gnome lichen as Endangered.

Rock Cress *(Arabis perstellata)*

This rock cress, a perennial in the mustard family (Brassicaceae), is known only from Kentucky and Tennessee. It has a grayish appearance due to the large quantity of hairs on the stems and foliage. Each spring, new stems about 80 centimeters (31.5 inches) tall arise from a basal rosette produced the previous year. The inflorescence is an elongate raceme with numerous flowers containing pale green sepals and white to lavender petals. Rock cress colonies grow at moist sites on steep, wooded slopes with limestone outcrops.

There are two recognized varieties of *Arabis perstellata*: the small rock cress *(A. p.* var. *perstellata)*, which occurs within three counties in Kentucky, and the large rock cress *(A. p.* var. *ampla)*, known only from one county in Tennessee. These plants face habitat damage or loss due to residential, commercial, or industrial development; logging; grazing and trampling; and the spread of competing plants, especially the non-native European garlic mustard *(Alliaria petiolata)*. Because of these threats, the FWS proposed January 3 to list both varieties of the rock cress as Endangered.

Endangered Species in the National Parks

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species on lands and in waters under its jurisdiction. The survey found that over 120 Endangered or Threatened species occurred or were suspected in more than 140 units of the National Park System.

Some listed species occur in many parts of the System. For example, the bald eagle *(Haliaeetus leucocephalus)* nests, migrates, or winters in 71 parks, while the peregrine falcon *(Falco peregrinus)* occurs in 59. But most listed species in the parks are very restricted; the survey found that 74 species occur in only one or two parks each. Some Endangered species are known to occur only in NPS areas, such as the Presidio manzanita *(Arctostaphylos pungens* ssp. *ravenii)*, a large shrub, at Golden Gate National Recreation Area, California; the Lee pincushion cactus *(Coryphantha sneedii* var. *leei)* at Carlsbad Caverns National Park, New Mexico; the Shenandoah salamander *(Plethodon shenandoah)* at Shenandoah National Park, Virginia; and the Devils Hole pupfish *(Cyprinodon diabolis)* at Death Valley National Monument, California. Coastal parks in the southeast contain some of the highest numbers of listed species in the System. Everglades National Park and Canaveral National Seashore in Florida support more than any other unit in the continental U.S., with 15 and 14 listed species respectively.

Most parks on oceanic islands also contain Threatened or Endangered species. Native species on these islands are especially vulnerable to competition or predation by introduced species. The problem is acute in the Hawaiian Islands. Haleakala National Park, for example, has 15 listed species and Hawaii Volcanoes National Park has 12. Many plant species in these parks are candidates for listing, and in the State as a whole, 300-400 plant taxa are considered at risk of extinction.

NPS Management Actions

The Park Service takes a variety of measures to monitor, protect, maintain, and restore Threatened and Endangered species in the parks. For example, the Big Bend National Park staff in Texas annually monitors the park's five known populations of the Chisos Mountain hedgehog cactus *(Echinocereus chisoensis* var. *chisoensis)* to document their condition and status. This Threatened plant numbers only 800 to 1,000 individuals, which occur in the park within a narrow band. Intensive livestock grazing before the park was established seriously degraded the vegetation and may have reduced the numbers of this taxon. Monitoring the populations will enable the NPS to determine if this variety is increasing in number now that livestock grazing has been prohibited in the area.

The NPS faces a different issue in protecting the Endangered Kentucky cave shrimp *(Palaemonias ganteri)*, which occurs only in Mammoth Cave National Park, Kentucky. The population of this unique crustacean could be decimated if sewage seeps into the groundwater, which feeds the cave's subterranean streams. The park staff is working with local authorities to develop a regional sewage treatment system to prevent any such pollution.

Some situations call for the protection of Endangered species from predators. At Canaveral National Seashore in Florida, screens are put around the nests of Endangered loggerhead sea turtles *(Caretta caretta)*, green sea turtles *(Chelonia mydas)*, and leatherback sea turtles *(Dermochelys coriacea)* to prevent raccoons *(Procyon lotor)* from digging up the eggs. At turtle nesting beaches in Virgin Islands National Park, mongooses *(Herpestes* sp.), non-native mammals, are periodically trapped. In Haleakala National Park in Hawaii, rats (*Rattus* sp.), feral cats *(Felis catus)*, and mongooses are live-trapped to protect nesting Hawaiian dark-rumped petrels *(Pterodroma phaeopygia sandwichensis)*. Nearly the entire known population of this Endangered bird breeds in or near the park's volcanic crater.

Habitat management is another approach taken to protect listed species. Prescribed burning at Big Cypress National Preserve in Florida and Congaree Swamp National Monument in South

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Endangered Species in the National Parks

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Carolina compensates for the loss of natural fire cycles that maintained the open pine stands required by red-cockaded woodpeckers *(Picoides borealis)*. At Milagra Ridge in Golden Gate National Recreation Area, California, the park staff has removed nonnative pampas grass and replanted 200 acres (80 ha) with native grasses, two nectar-producing species, and the lupines and sedum upon which the Endangered mission blue butterfly *(Icaricia icarioides missionensis)* and San Bruno elfin butterfly *(Callophrys mossii bayensis)* lay their eggs.

Intensive management has been required to keep the Big Bend gambusia *(Gambusia gaigei)*, a small fish, afloat. At one time, its population was reduced to a single female and two males, but this Endangered species has been restored to a safer level by captive breeding. It now survives in the wild in an artificial warmwater pond and two recently created ponds in Big Bend National Park, Texas. The warm water in the artificial pond, supplied from a nearby spring by a pump, protects the fish against the threat of cold weather. Constant vigilance is needed to prevent the possible introduction of fish species that would compete with or prey on the still vulnerable gambusia. A back-up population is maintained at the Fish and Wildlife Service's National Fish Hatchery in Dexter, New Mexico, and a few individuals are kept for research and back-up at several other institutions.

Sometimes human activities in the parks must be controlled. Research has shown, for example, that human disturbance is one of the principal factors in the decline of the piping plover *(Charadrius melodus)*, a Threatened shorebird. Signs, ropes, and special regulations are used seasonally to restrict beachgoers at some plover nesting areas on Cape Cod National Seashore in Massachusetts, Assateague Island National Seashore in Maryland, and other coastal units where the plover breeds.

Each summer, Endangered humpback whales *(Megaptera novaeangliae)* feed in Glacier Bay National Park in southeast Alaska. In 1978, 17 of the 20 whales present abruptly departed, prompting the NPS to consult with the National Marine Fisheries Service (NMFS), which has Endangered Species Act responsibility for this rare marine mammal. Following NMFS's recommendations, the Park Service restricted the number of vessels entering the bay and prohibited close approaches to the whales. When cruise ship and tour boat operators objected to the regulations, the NPS began research on the whales. This showed that loud vessel noise or erratic vessel movement could indeed cause disturbance of whale feeding and social behavior. Regulations in place today limit the numbers and classes of vessels that can enter the bay in summer, establish vessel operating restrictions, provide a mechanism for designating restricted whale waters and vessel limits, and prohibit the harvest of certain species of fish and crustaceans that the whales eat. Researchers are continuing to study the movements and behavior of the whales in the bay.

photo by J. Snyder

The careful use of prescribed burning is a management tool that can compensate for the suppression of natural fires, which once maintained the open habitat needed by some species. This burn at Big Cypress National Preserve in Florida was used to benefit the red-cockaded woodpecker.

Recovery Efforts

The NPS is involved in restoring species in many parks. Tennessee purple coneflowers *(Echinacea tennesseensis)* have been successfully planted at Stones River National Battlefield, Tennessee, and have increased their numbers. Peregrine falcons have been hacked at Shenandoah, Isle Royale, Rocky Mountain, and other national parks across the country.

A new endeavor for the Park Service, in cooperation with the Fish and Wildlife Service, is the captive propagation of red wolves *(Canis rufus)*. Gulf Islands National Seashore, Mississippi, is one of the island sites now used for captive rearing of these Endangered animals. Some of the red wolves raised at this site were transported to Great Smoky Mountains National Park on the Tennessee/North Carolina border. After an intensive public information effort by the Park Service and Fish and Wildlife Service, which found strong local interest and little opposition, releases of red wolf families into the park began. Several wolves died, but radiocollar monitoring has shown that the animals have found enough wild prey, seldom wander outside the park, and have taken only a few domestic livestock (for which the owners have been compensated). It is too early to predict long-term success, however. (For more background, see *Bulletin* Vol. XV, No. 6.)

NPS Activities in the Future

Although much is being done for Endangered plants and animals in the na-

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Protecting Endangered Species at Canaveral National Seashore

by John Stiner

To many people, the thought of Canaveral National Seashore conjures up images of long stretches of pristine beach or spectacular NASA shuttle launches. Not as well known is the fact that the Seashore contains one of the most productive inshore fisheries on the entire eastern seaboard, over 100 archeological sites, and the second largest number of federally-listed Endangered and Threatened species in the entire National Park System. Fourteen species of protected animals inhabit the 24,000-hectare (59,300-acre) park.

The best known resource management activity at Canaveral National Seashore is the "Night Stalker" sea turtle nest protection program. Between 3,000 and 4,000 sea turtle nests are recorded from the park's beaches each year. Over 90 percent of these nests are from loggerheads *(Caretta caretta)*, with the remainder from greens *(Chelonia mydas)* and an occasional leatherback *(Dermochelys coriacea)*. Before 1984, more than 95 percent of the nests were destroyed by raccoons, which dig up and eat the turtle eggs. Since that time, the park has initiated night patrols to search out the nests soon after the eggs are laid and cover them with wire mesh screens. This has reduced depredation to less than 20 percent. Last year, about 50 volunteers sacrificed sleep and braved the mosquitoes to donate almost 2,000 hours of labor to protect the nests.

Raccoon removal has been proposed as a solution to the problem. However, the National Park Service discourages single-species management, and the reduction of any important natural predator — such as the raccoon — could have unforeseen effects on the Seashore's ecosystem.

photo by David McEwen

Standing 3.3 feet (1 meter) tall, with a wingspan of 5 feet (1.5 m), wood storks are impressive birds. As they wade through muddy or vegetation-filled water, the storks use their massive bill to catch fish.

In January, the University of Georgia initiated a 2-year study to gather critical information on raccoon density, age and sex distribution, incidence of disease, seasonal movements, and diet. Also included were experiments on conditioned taste aversion, in which chicken eggs injected with estrogen were placed in the dunes to induce nausea in raccoons, and the implantation of Norplant birth control devices in mature females. These data will be used to assist management in developing a comprehensive long-range program of sea turtle nest protection.

The feral hog *(Sus scrofa)* is an unwelcome non-native predator at the Seashore. This alien species threatens a number of the Seashore's native protected animals. Voracious predators of snakes, the hogs may be harming the park's population of eastern indigo snakes *(Drymarchon corais couperi)*, a subspecies already listed as Threatened, as well as other native reptiles and amphibians. Although it has yet to frequent the beach area of the park, the hog has caused major damage to sea turtle nests in areas just to the south. The danger to the Seashore's sea turtle nests is immense.

So far, the hogs have proven impossible to control. The Fish and Wildlife Service is trapping on the adjacent Merritt Island National Wildlife Refuge and in portions of the Seashore. More than 2,500 hogs were removed last year without any visible effect on the population. More stringent measures are being investigated.

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Endangered Species in the National Parks

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tional parks, there is room for improvement. The NPS intends to complete a more detailed inventory of endangered species in the National Park System, provide additional training to its employees on endangered species management and interagency consultation procedures, contribute additional resources to implementing recovery plans for species found in national parks, and increase its efforts to inform scientists and other agencies about the work being done in the parks.

The NPS is committed to maintaining the biological diversity of the National Park System, including Threatened and Endangered species. Its role in protecting and restoring listed species and their habitats will undoubtedly increase in importance as the number of listed species in the Nation increases.

Napier Shelton recently retired from the National Park Service, where he was a writer with the Division of Wildlife and Vegetation in Washington, D.C.

Canaveral National Seashore

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The smallest of the Seashore's protected species, the southeastern beach mouse *(Peromyscus polionotus niveiventris)*, occurs at several locations along the 39 kilometers (24 miles) of dune line. In 1991 and 1992, it was detected north of its previously confirmed range. However, the beach mouse was not found in the northernmost section of the park, probably due to predation by feral cats and possibly competition with house mice *(Mus musculus)*. The park is attempting to remove the cats, although they are constantly being replenished from the adjacent developed area. Trash receptacles have been redesigned to prevent raccoons and other animals from scattering litter, in an effort to reduce the likelihood of house mice infestations.

The Intracoastal Waterway, which runs along the western boundary of the park, is a major thoroughfare for West Indian manatees *(Trichechus manatus)* as well as boats. The State of Florida has implemented slow-speed zones in the Waterway to reduce the number of manatee deaths from boat collisions. The State is currently involved in a hotly contested battle over the length and location of these zones.

The presence of one slow-speed zone adjacent to the Seashore has encouraged boaters to detour through the park, threatening manatees using shallow areas adjacent to the Waterway. The park is working with State and county agencies to survey manatee use and distribution to identify critical areas that need speed restrictions.

Habitat Management

One of the most inconspicuous species within the Seashore is the Atlantic salt marsh snake *(Nerodia fasciata taeniata)*, which occurs on the mangrove islands of Mosquito Lagoon. Much of this area was ditched and diked for mosquito control prior to the park's creation. This destroyed valuable salt marsh and, as the ditches filled in at the ends, ironically created additional mosquito breeding areas. The park is obligated by deed with the State of Florida to cooperate with the local mosquito control district in its efforts to reduce mosquitos in the most environmentally acceptable manner. Recently, a mosquito growth inhibitor (Altosid) was applied to over 4,000 acres (1,620 hectares) of potholes and ditches within the Seashore.

photo by David Goethe

Having thus far escaped predators, this loggerhead hatchling races for the water.

In consultation with Fish and Wildlife Service, the park is experimenting with Open Marsh Management techniques in highly disturbed (ditched and diked) areas to reduce the need for chemical use and to rehabilitate former marshes. Rotary ditching contours the old ditch networks to simulate natural tidal creeks, thereby enhancing habitat for species of fish that eat mosquito larvae. Salt marsh snakes have also been observed using the contoured ditches, burrowing into the banks and feeding on fish that frequent the ditches.

Another species that could benefit from improved ditching practices is the wood stork *(Mycteria americana)*, a large wading bird that feeds on fish in potholes and ditches. Low earthen sills are being installed to prevent complete drainage of the potholes during low tide, which could result in the loss of important foraging sites. The presence of wading birds in ditched versus non-ditched areas will be monitored to determine the effects of Open Marsh Management.

The Seashore also is developing a Fire Management Plan that will allow the use of prescribed burns. The carefully managed use of fire is crucial to maintain habitat for such species as the Florida scrub jay *(Aphelocoma coerulescens coerulescens)*, which lives in open oak scrub. The bald eagle *(Haliaeetus leucocephalus)* also will benefit. A key factor limiting the recovery of the eagle population in the park and the Merritt Island Refuge is the small number of suitable nest trees. Eagles nesting at the Seashore will use only the largest tree in a clump of old pines. Abnormally high fuel loads resulting from past fire suppression policies could result in a large, uncontrolled fire and destroy these trees. A combination of mechanical fuel reduction and managed, low-intensity burns may be needed to protect these trees and maintain suitable eagle nesting habitat.

Other species requiring habitat that is burned periodically, particularly to maintain areas of bare sand, are the eastern indigo snake and a species of special concern, the gopher tortoise *(Gopherus polyphemus)*. The tortoise is a keystone species whose burrow provides shelter for dozens of other species, including the indigo snake.

John Stiner is a Resource Management Specialist at the Canaveral National Seashore.

Restoring Endangered Species in Hawaii Volcanoes National Park

by Dan Taylor

photo by R.J. Shallenberger

The nene or Hawaiian goose is associated primarily with upland habitats rather than wetlands.

The unique animals and plants of the Hawaiian Islands represent an eminent example of adaptive radiation. A relatively small number of species made their way to the geographically isolated archipelago, colonized its wide variety of habitat types, and evolved into a diverse biota. The arrival of the first human settlers, however, initiated tremendous changes. People, together with the animals and plants they brought with them, have caused wide-scale alterations in the islands' array of ecosystems. Many of Hawaii's endemic species—especially the birds— have become extinct, and many of those that remain are rare and/or declining.

Hawaii Volcanoes National Park, situated on the island of Hawai'i (the "Big Island"), is well known for its spectacular volcanic eruptions. But it also contains important habitat for many rare native animals and plants, and can play an important role in their conservation.

Birds

The nene, or Hawaiian goose *(Nesochen sandvicensis)*, the State bird of Hawaii, has thus far escaped extinction. Unlike other geese, nene are slightly cumbersome fliers and, as terrestrial birds, they have only a mild penchant for wetlands. Fewer than 600 free-flying nene remain, and they are found on 3 of the State's 7 main islands: Hawai'i, Maui, and Kaua'i.

Nene populations were reduced by predation from introduced animals (primarily mongooses and feral cats), the decline of native food plants due to grazing and competition from introduced plant species, and the loss of natural habitat to agriculture and urbanization. These problems continue to make nene productivity in the wild extremely low. Some adults are killed every year along roadsides by motor vehicles, and we believe this is another significant loss of reproductive potential.

Since the species' decline, nene populations have been sustained by intensive husbandry. The State of Hawaii (Department of Forestry and Wildlife) and two units of the National Park System — Haleakala and Hawaii Volcanoes — maintain captive adult birds, which are used as breeders and/or foster parents for captive-bred goslings. The State operates an advanced breeding facility on Maui, and donates some goslings to the parks for release in the wild. The parks maintain captive nene pairs in open-topped pens within wilderness thresholds to serve as foster parents for young birds. These young are donated by State brooders or are hatched by captive pairs. Birds that fledge in the pens then become free-flying and wild. Wild nene are also produce some young, but not enough to sustain the population.

Park management emphasizes enhancing backcountry feeding areas for the nene by regularly mowing large plots of senescent alien grasses to produce palatable sprouts. Managers also plan to develop more efficient predator control methods, enlarge and improve conditions inside the open-topped backcountry release pens, and make road corridors safer for nene. Our goal is to achieve a self-sustaining, free-flying population in an environment with manipulated refuges. Scientists from the United Kingdom Wetlands and Wildfowl Trust are advising the parks in this nene management and habitat enhancement effort.

Forest birds have proven a greater challenge to conserve. Most of Hawaii's original endemic forest bird species are now extinct. Some were overcollected early for their colorful feathers, and others have declined due to habitat loss and the effects of exotic species. Currently, there are 19 species of Hawaiian forest birds listed as Threatened or Endangered. The main threats to the survival of forest birds now are avian disease (especially malaria, which is borne by introduced mosquitos), degradation of forests by invasions of alien plants and animals (especially feral pigs), and direct losses of native forests to urbanization, agriculture, and fire. Four forest bird species once known in Hawaii Volcanoes National

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Hawaii Volcanoes National Park

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Park are listed as Endangered, and are now found only in neighboring forests.

Forest conservation is the basis for forest bird conservation. The park's main management effort is to control feral pigs and alien plants. In addition, the park and neighboring land managers are developing a regional forest management stategy for more than 20,000 acres (8,100 hectares) of native montane forest. To address another serious threat, National Biological Survey scientists are studying avian diseases.

Pelagic birds, like forest birds, are threatened because their terrestrial habitat is degraded. Hawaii Volcanoes National Park is visited by the 'ua'u or Hawaiian dark-rumped petrel *(Pterodroma phaeopygia sandwichensis)* and the 'a'o or Newell's Townsend's shearwater *(Puffinus auricularis newelli)*, both of which come ashore to nest. They are threatened by disorientation from artificial lights, collisions with overhead wires, predators, and limited habitat. The park's protection strategy includes delineating nesting territories and trapping the non-native predators within them. Haleakala National Park on the island of Maui has demonstrated success in protecting both petrels and shearwaters.

The State of Hawaii has only two native raptors, the 'io or Hawaiian hawk *(Buteo solitarius)* and the pueo or short-eared owl *(Asio flammeus sandwichensis)*. Both occur within Hawaii Volcanoes National Park. They are listed for protection (the hawk federally and the owl by the State), primarily because of habitat destruction and low reproductivity. Both have been able to maintain small populations because they have adapted somewhat to their changed environment. There are no specific plans for management of these birds in the park, but it is expected that the general programs for controlling alien plants and animals will benefit both species.

Sea Turtles

Hawksbill *(Eretmochelys imbricata)* and green *(Chelonia mydas)* sea turtles frequent the park's shores, but only the hawksbill nests here. Hawksbill sea turtles are among the most imperiled marine species. Threats to hawksbill survival in Hawaii include nest predation by mongooses and feral cats, disturbance of nesting territory by people, and incidental take during fishing.

Turtles make their nests on only five or six beaches in Hawaii, and only two of these are within the park. Unfortunately, some people have not learned to share beaches with turtles. Gravid female turtles have been displaced by campers, nests have been contaminated by garbage and crushed by campers, and hatchlings have been disoriented by lights and campfires.

The park's protection efforts consist of intensive monitoring and exotic predator trapping at nesting beaches during the turtles' June-November nesting season. We have also relocated some camping sites to protect turtle nests from disturbance. Persons doing the trapping and monitoring (mostly volunteers) talk to beach-goers and can usually persuade them to modify their behavior if it threatens turtle nests.

Plants

There are 377 native vascular plant species in Hawaii Volcanoes National Park. Five are listed by the Fish and Wildlife Service as Threatened or Endangered, another 14 species are proposed for listing, and yet another 17 species are considered listing candidates (as of January 1994). They became rare after being eaten or trampled by feral ungulates, outcompeted by invasive alien plants, or burned in fires.

The park's protection strategy is to strengthen the native ecosystem by removing alien species, beginning first with ungulates. Non-native species are removed from a large area in order to promote recovery of an entire plant and animal community. This is usually followed by alien plant control, often in smaller units in which native plant communities are relatively intact and species diversity is highest.

Research workers and managers have started mapping the distribution and determining reproductive status and population sizes of some rare species in these units. This will provide the information base needed for managing individual species.

photo by Linda Pratt

Kokia drynarioides, *an attractive but rare tree in the mallow family (Malvaceae), has palmately lobed leaves and large red flowers. Although this species is not known to have occurred naturally within Hawaii Volcanoes National Park, it is endemic to the Big Island, and the Park shelters a transplanted colony.*

Dan Taylor is Chief of the Division of Resources Management at Hawaii Volcanoes National Park.

Endangered Species Conservation at Big Bend National Park

In western Texas, along the United States/Mexico border, the Rio Grande abruptly changes course, sweeping to the northeast after flowing south and southeast for almost one thousand miles. This large arc gives the region its name, the Big Bend. At the river's very turning point lies Big Bend National Park, which boasts a rich variety of habitats — desert, river floodplains, grasslands, and mountains — in a preserve nearly the size of Rhode Island.

Big Bend National Park is home to a number of plant and animal species protected under the Endangered Species Act. Representatives of this group include the peregrine falcon *(Falco peregrinus anatum),* Big Bend gambusia or mosquitofish *(Gambusia gaigei),* black-capped vireo *(Vireo atricapillus),* Mexican long-nosed bat *(Leptonycteris nivalis),* and Chisos Mountain hedgehog cactus *(Echinocereus chisoensis* var. *chisoensis).* Another species, the Mexican wolf *(Canis lupus baileyi),* no longer occurs in the Big Bend region, but is receiving increasing attention because of possible reintroductions in other parts of its range.

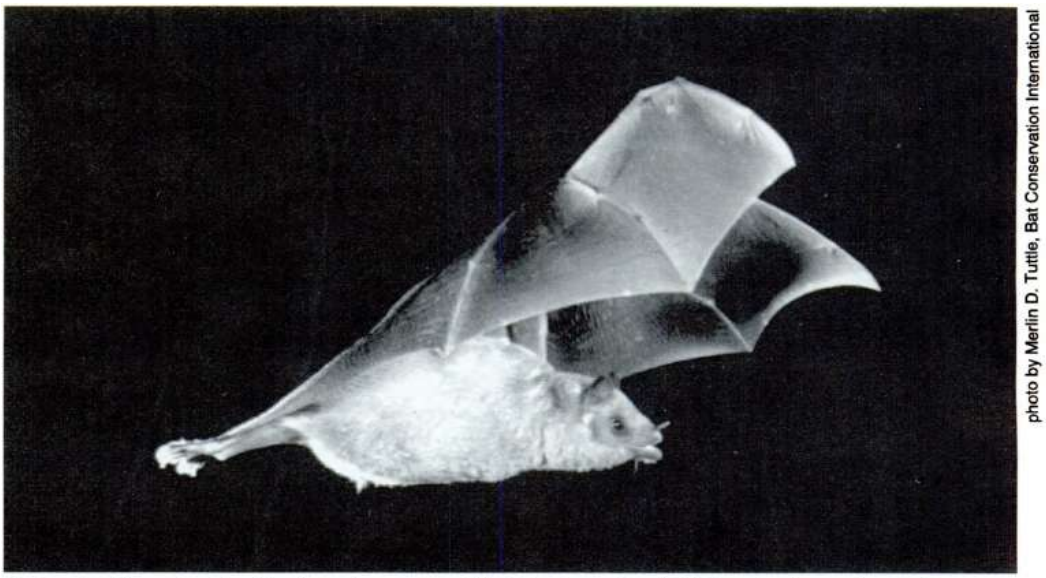

photo by Merlin D. Tuttle, Bat Conservation International

Instead of insects, the Mexican long-nosed bat feeds on the highly caloric nectar and protein-rich pollen of certain cacti and agaves. Its long muzzle and tongue allow the bat to reach deep into the flowers.

Peregrine Falcon

This remarkable bird of prey was well-distributed in the U.S. until the 1950's, when it began to suffer a severe decline. Contributing factors included shooting, illegal captures, and habitat loss or disturbance, but the main cause was the increasing use of the pesticide DDT. This chemical inhibits calcium metabolism in raptors, resulting in thin eggshells that break prematurely. Most uses of DDT are now prohibited in the U.S., but the pesticide is still applied in some countries.

Big Bend has had moderate success in restoring its falcon population by protecting eyries from disturbance during the breeding season. Sections of several trails in the Chisos Mountains and along the Rio Grande canyon rims are closed at these times, and river runners are limited to non-motorized craft. Fifteen peregrines fledged in 1991, eight fledged in 1992, and six fledged in 1993.

Big Bend Gambusia

The Big Bend gambusia, or mosquitofish, is a small fish restricted to a warm spring pond system near Rio Grande Village in the southeastern section of the park. It is not only extremely limited in range but also is highly adapted to local habitat conditions, which makes this species extremely vulnerable to fluctuations in water quality, quantity, and temperature. At one time, the population was reduced to one female and two males held in captivity. To ensure the species' future, the artificial refugium was modified to receive piped-in warm water on a day-to-day, year-round basis.

The gambusia population is now stable in the refugium and in two other warm water spring ponds in the area. Park personnel regularly monitor the habitats. Continued threats to the species include proposed campground expansion, floods on the Rio Grande (which could allow invasion of the pond by competing or predatory fish species), and anglers transferring fish to the gambusia habitats. Captive populations of the Big Bend gambusia are maintained at the Fish and Wildlife Service's Dexter National Fish Hatchery in New Mexico and the University of Texas at Austin as a precaution against extinction of the wild population.

Black-capped Vireo

The black-capped vireo is a summer resident of Big Bend, where it is found in brushy canyon areas. Aside from habitat loss, one of the biggest threats this species faces is brood parasitism by the brown-headed cowbird *(Molothrus ater),* which is known for its reproductive strategy of laying eggs in the nests of other bird species. Cowbirds often lay their eggs before the vireo clutches are completed, and their eggs hatch sooner. By the time the vireos do hatch, the cowbird nestlings are larger and more competitive, and the vireo parents raise them as their own. Sometimes cowbirds will even "kick out" the vireo eggs. This behavior has obviously led to reduced reproductive success of vireos.

In 1987, the same year the black-capped vireo was listed as Endangered, Big Bend National Park initiated a study

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Big Bend National Park

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of the park's population. Since the studies began, vireo numbers have fluctuated between 12 and 16, and their nest locations vary from year to year. Brown-headed cowbirds were trapped for 5 years, but efforts to correlate taking of cowbirds to fledging success of vireos were not conducted. For now, vireos are being monitored annually to determine population status and reliable breeding areas. Black-capped vireos also nest at scattered locations in central Oklahoma, central and western Texas, and northern Mexico.

Mexican Long-nosed Bat

As its name indicates, the Mexican long-nosed bat is primarily a Mexican species. Its sole known roosting site in the U.S. is a cave near Emory Peak in the Chisos Mountains. The bats migrate south through Mexico and into Central America. One of this species' distinctive features is its long tongue, which at 3 inches (75 millimeters) almost equals its entire head and body length, and is an adaptation to feeding at flowers. The diet of these small bats consists mostly of nectar, but they also ingest pollen, which is rich in protein.

There is an apparently close interdependence between these bats and their food plants. Annual bat migrations seem to be associated with the times that agaves and cacti flower in certain areas. The plants benefit, too; long-nosed bats are important pollinators of some cactus and agave species. In Big Bend, the bats rely almost exclusively on the flowers of agaves, including the well-known century plant *(Agave harvardiana).*

The long-nosed bat was once very common in Mexico, but recent surveys have revealed massive population declines. In Big Bend, 10,650 bats were counted in 1976, yet during 1980-1984 only 1,000 were estimated each year. Several factors have contributed to this severe loss, including the undeservedly poor public image many bats still have, which leads to incidents of vandalism and mass killing at roost sites. Perhaps the biggest problem, however, is the intensive harvesting of wild agaves in Mexico by "moonshiners" for the small-scale production of tequila and other alcoholic beverages. This practice has resulted in a loss of food sources along the bats' migratory routes, a serious problem when one considers that the high metabolic rate of this mammal requires it to feed very frequently.

Annual population counts are needed to assess the species' local status in Big Bend, but typical bat censusing techniques have several major drawbacks. One method of counting bats is to set up a video camera at the opening of a known roosting cave and visually record the flight of the bats when they leave the cave. However, unlike some other bat species, *Leptonycteris nivalis* tends to leave and re-enter a cave several times before leaving the roost site to feed, making visual counts questionable. Long-nosed bats also share their roosting caves with other bat species, making census accuracy even more difficult.

Even if the roosting site at Big Bend is protected, efforts are needed in Mexico to curtail the destruction of bats and agaves if the species is to recover.

National Park Service photo

The Chisos Mountain hedgehog is a small, barrel-shaped cactus with deep green to bluish-green stems, and produces attractive red, white, and fuchsia-colored flowers.

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Big Bend National Park

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Threatened and Endangered Plants

One rare plant unique to Big Bend National Park, the Chisos Mountain hedgehog cactus, was listed in 1988 as Threatened. It grows amid sparse Chihuahuan Desert vegetation on alluvial flats near the Chisos Mountains, the local range from which the plant takes its name. Severe overgrazing prior to World War II eliminated most of the native short grass cover, which may have altered the preferred habitat conditions for establishment of Chisos hedgehog cactus seedlings. Recovery of overgrazed desert rangelands is a slow process, and some desert plant communities never return to their former composition.

Park biologists and resource managers monitor the cactus population, and conduct surveys prior to such activities as road maintenance and trail construction. In 1989, 10 specimens were removed from the shoulder of one park road and sent to the Chihuahuan Desert Research Institute in Alpine, Texas, for propagation. The rescued plants were scarred to produce extra stems, and up to 350 cuttings have been rooted. However, because the offsets were produced clonally, they have the same genetic makeup. The original plan was to transfer them to the park, but genetic swamping of the natural population has become a concern. Methods for how at least some of the rooted cuttings can be reintroduced are under review.

Chisos Mountain hedgehog cacti, like all plants in the park, are protected. They may not be collected without a permit, although "cactus rustling" remains a threat. Other cacti listed as Threatened that are found in the park include the bunched cory cactus *(Coryphantha ramillosa)* and Lloyd's mariposa cactus *(Neolloydia mariposensis).*

Several other plants in the park are candidates for listing under the Endangered Species Act. Recent field studies have addressed the status, distribution, and reproductive biology of such species as the little-leaf brongniartia *(Brongniartia minutifolia),* which belongs to the pea family (Fabaceae); tall paintbrush *(Castilleja elongata),* a plant in the family Scrophulariaceae; Guadalupe fescue *(Festuca ligulata),* a member of the grass family (Poaceae); and Chisos agave *(Agave glomeruliflora).*

Material for this story was provided by Carol Benzing, Interpretive Park Ranger, and Michael Fleming, Environmental Protection Specialist, at Big Bend National Park.

Regional News

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arrange construction activities — for example, mounting launching sites, television cameras, and mirrors for the laser light show. During late June, July, and August, the Tower City Center used a closed circuit camera and two TV monitors, provided by a local company, to show customers the nesting peregrines and, finally, their two chicks.

The fireworks celebration incorporated images of flying falcons in the laser show. At one point in the program, the Cleveland orchestra played a lullaby, while tens of thousands of people, taking on the role of peregrine caretakers, sang for the soon-to-hatch falcons.

* * *

A meeting between the FWS Bloomington, Indiana, Field Office and the Office of Surface Mining to discuss how the pending Federal listing of the northern copperbelly water snake (*Nerodia erythrogaster neglecta*) might impact Indiana's coal mining industry resulted in the decision to develop a habitat conservation plan. The snakes live in lowland swamps or other warm, quiet waters and use upland woods as winter hibernation sites.

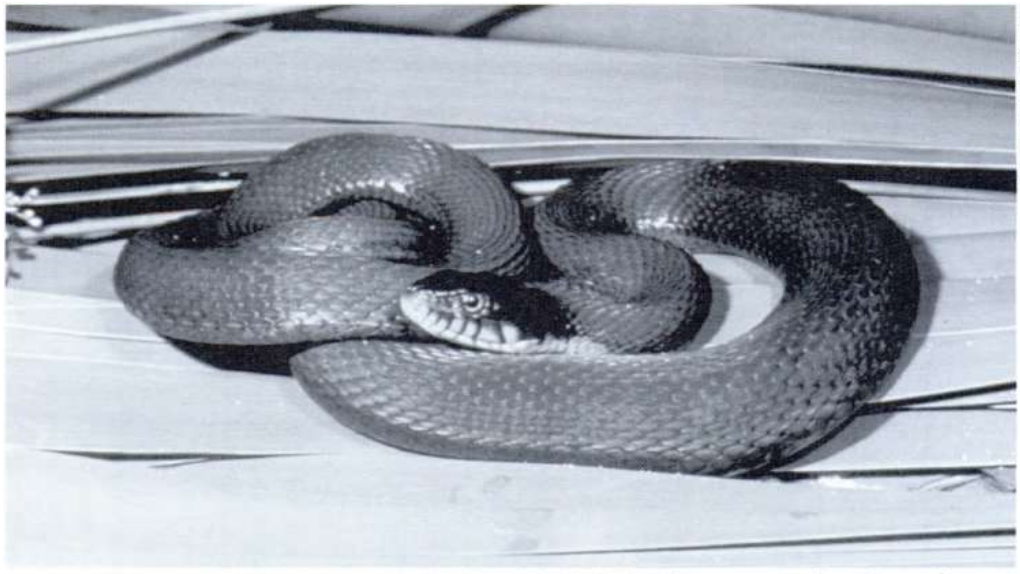

photo by J.R. MacGregor

The northern copperbelly water snake is the subject of a habitat conservation plan to be developed with coal mining interests in Indiana.

* * *

The Minnesota Department of Agriculture is conducting a voluntary landowner herbicide use agreement program to protect federally listed plant species. The program focuses on establishing no-use buffers around plants such as the Minnesota dwarf trout lily (*Erythronium propullans*), prairie bush clover (*Lespedeza leptostachya*), western prairie fringed orchid (*Platanthera praeclara*), and Leedy's roseroot (*Sedum integrifolium* var. *leedyi*). Funded as a pilot by the Environmental Protection Agency, the program has the

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Regional News

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support of Region 3 and the Minnesota Department of Natural Resources.

* * *

Region 4 - Despite their discovery of two new occurrences of the Tar spinymussel (*Elliptio steinstansana*) in 1993, biologists with the North Carolina Wildlife Resources Commission and the FWS regard this mussel as one of the most critically endangered North American species. Named for the Tar River system in eastern North Carolina, where it is endemic, the Tar spinymussel is one of only three species of freshwater mussels in the world with spines. Biologists found the 1993 specimens in Little Fishing Creek and Shocco Creek, two small tributaries.

The Tar spinymussel is believed to have existed historically throughout much of the Tar River system. By 1985, however, habitat deterioration resulting from sedimentation and water pollution dramatically reduced the species' numbers and range, and it was listed as Endangered. By 1990, the species was rarely found. At that time, only one reproducing population, restricted to Swift Creek — another small tributary — was known to survive.

Biologists consider the newly discovered population in Little Fishing Creek relatively healthy, based on the evidence of recent reproduction from shells found in muskrat middens. However, the population is known to occur only within a short reach of this small creek, making it vulnerable to any habitat alteration or degradation. The other new record is a single specimen, also collected from a muskrat midden, in Shocco Creek. Portions of the creek have been degraded severely in recent years.

* * *

Region 5 - Biologists searching for remnant populations of the once-widespread American burying beetle (*Nicrophorus americanus*) increased the knowledge of this secretive insect but added only one area to its range: McCurtain County, Oklahoma, adjacent to known habitat.

The American burying beetle is known to occur only in Rhode Island, Massachusetts (in a small reintroduced population), several counties in eastern Oklahoma, a nearby part of Arkansas, and two counties in Nebraska. Several of the county occurrences are represented by a single or few specimens.

Biologists conducted the 1993 surveys in selected localities in Maine, Massachusetts, Pennsylvania, New Jersey, North Carolina, Arkansas, Mississippi, Ohio, Oklahoma, and Nebraska. Despite the surveys in 10 States within the historic range of the species, no new areas (aside from the one county) were added to the current range.

The American burying beetle has been federally protected since July 1989, when the magnitude of the species' decline became apparent. Says FWS biologist Michael Amaral, "We haven't unlocked the mystery yet of just what caused the reduction in numbers. This is still an enigma, but we think several factors relating to habitat alteration and its effect on both food availability and competition for limited food (carrion) resources are responsible."

photo by Christopher Raithel, Rhode Island Department of Fish and Wildlife

One of nature's most efficient recyclers, the American burying beetle eats carrion, converting animal protein to soil nutrients. Historically distributed in 35 States, the District of Columbia, and 3 Canadian provinces, this insect declined drastically in number and range even before the widespread use of DDT. Carrion availability may determine where the species can survive today; changes in land use have reduced its food supply (small-to-medium birds and mammals) and increased the competition for carrion, a limited resource. There is also speculation that even the extinction of the once ubiquitous passenger pigeon may have had a ripple effect on the status of the beetle.

Measuring 1-1/2 inches in length, this species is the largest of the North American carrion beetles. It has a black "patent-leather" body complemented by bright red-orange scallops. After burying the remains of a chipmunk or dove, the beetle strips the fur or feathers and coats the carcass with secretions to preserve it.

photo © Richard Biggins

The Tar spinymussel is a freshwater mollusk endangered primarily by sedimentation and water pollution from a variety of point and non-point sources. This photo was taken in Sandy (Swift) Creek, Nash County, North Carolina.

BOX SCORE
LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S.	ENDANGERED Foreign Only	THREATENED U.S.	THREATENED Foreign Only	LISTED SPECIES TOTAL	SPECIES WITH PLANS
Mammals	56	251	9	22	338	37
Birds	73	153	17	0	243	73
Reptiles	17	63	18	14	112	30
Amphibians	6	8	5	0	19	9
Fishes	62	11	39	0	112	62
Snails	12	1	7	0	20	26
Clams	50	2	6	0	58	40
Crustaceans	11	0	2	0	13	4
Insects	17	4	9	0	30	15
Arachnids	4	0	0	0	4	0
Plants	352	1	82	2	437	178
TOTAL	660	493	190	38	1,386*	474**

Total U.S. Endangered	660	(308 animals, 352 plants)
Total U.S. Threatened	194	(112 animals, 82 plants)
Total U.S. Listed	854	(420 animals, 434 plants)

* Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, chimpanzee, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

** There are 377 approved recovery plans. Some recovery plans cover more than one species, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of CITES Party Nations: 120

March 3, 1994

March/April 1994 Vol. XIX No. 2

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

May/June 1994 Vol. XIX No. 3

DANGERED SPECIES

nical Bulletin

U.S. Department of the Interior
Fish and Wildlife Service

United States Imposes Limited Trade Sanctions on Taiwan for Continued Trade in Endangered Species

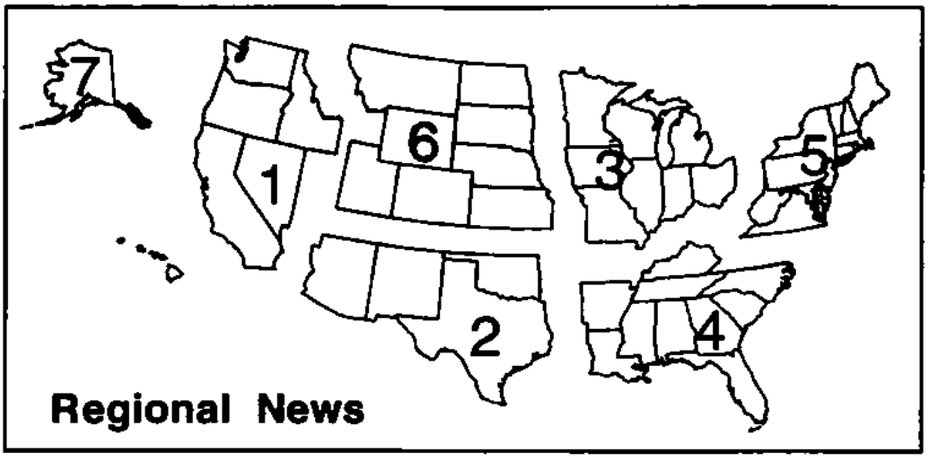
For the first time, the United States has imposed trade sanctions on another country to penalize trade in critically endangered wildlife. On April 4, President Clinton announced his decision to restrict the importation of wildlife products from Taiwan, which last year totalled approximately $22 million in value. The primary reason cited in the announcement was Taiwan's insufficient progress in controlling its trade in products made from tigers *(Panthera tigris)* and various rhinoceros species. Although the People's Republic of China also had been warned about possible sanctions, the U.S. decided not to impose sanctions at this time because of progress in China's enforcement of laws outlawing the trade.

Tigers and rhinoceroses face a dire outlook in the wild. The most immediate and dangerous threat to these species is poaching to satisfy the market in their parts and products, which are used extensively in traditional Asian medicines. At the turn of the century, the world's population of tigers stood at about 100,000, but the number has plummeted to only 5,000. Three of the eight subspecies are already extinct, and the largest of all living cats — the Siberian tiger *(P. t. altaica)* — may be lost soon. Global rhinoceros populations have fallen even more precipitously, from over 100,000 in 1970 to fewer than 10,000 today. The U.S. Fish and

(continued on page 10)

photo by Dr. Bruce W. Bunting, World Wildlife Fund-U.S.

Tigers are worth thousands of dollars on the black market, where their parts are sold for use in traditional Asian medicines. The United States hopes that economic sanctions will help to control the trade in tigers and other endangered wildlife.



Regional News

Regional endangered species contacts have reported the following news:

Region 2 - The Houston toad (*Bufo houstonensis*) will be the subject of a 3-day seminar of public and private organizations to focus on consensus-building to promote the survival and recovery of this Endangered species. A Population and Habitat Viability Analysis Workshop was held May 23-25, 1994, in Austin, Texas, to combine the resources of, among others, the National Fish and Wildlife Foundation, the Lower Colorado River Authority, and the Fish and Wildlife Service (FWS). The goal is a revised recovery plan that will lay the biological groundwork for habitat conservation planning.

The FWS recently conducted two public meetings in Bastrop County, Texas, to discuss ways protect the toad while allowing development of a growing community.

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The U.S. Whooping Crane Recovery Team met in Rockport, Texas, on February 24 and 25, 1994 to review its progress. Steve Nesbitt of the Florida Game and Fresh Water Fish Commission reported on the whooping crane reintroduction experiment at Florida's Kissimmee Prairie. Twelve of the 25 released birds survive, and another 8 birds are scheduled for shipment to Florida in March. A male and female released as juveniles in February 1993 have exhibited the characteristics of subadult pair bonding, including copulation. Although the earliest egg production is not expected until 1995, when the birds are 3 years old, this behavior is encouraging because it was not observed between whooping cranes cross-fostered in the Rocky Mountains.

The Team recommended continuing the experimental release in Florida for another year, and it expressed support for changes in captive rearing and wild release techniques designed to reduce losses from bobcat predation. Cranes will be trained to roost in water as chicks, and captive-reared bobcats will be used to teach the birds to avoid predators.

The Team meeting included a field trip to Aransas National Wildlife Refuge on the Texas coast to view the whooping cranes, as well as activities such as shoreline armoring to halt

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U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2:** Arizona, New Mexico, Oklahoma, and Texas. **Region 3:** Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4:** Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the U.S. Virgin Islands. **Region 5:** Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia. **Region 6:** Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7:** Alaska.

Controlling International Trade in Endangered Species

by Marshall Jones

This issue of the *Endangered Species Technical Bulletin* details international efforts, stretching from Washington, D.C., to Russia, China, and Taiwan, to protect the world's dwindling populations of tigers and rhinoceroses. But there is more to the story of our continuing fight to end harmful trade in endangered wildlife occurring outside U.S. borders. Some examples include:

- On February 28, the Fish and Wildlife Service's Office of CITES Management Authority initiated another Pelly Amendment review of trade in Asiatic black and brown bears, Malayan sun bears, sloth bears, clouded and snow leopards, gibbons, and orangutans, all of which reportedly pass through some of the same markets as tiger bone and rhino horn. A decision on what further action is needed, if any, is pending.
- Dialog with CITES authorities in the Republic of Korea continues regarding our expectations of Korea's continued progress in implementing CITES and eliminating the tiger parts trade in that country. Korea now appears to have the largest stockpile of tiger bone. Under threat of Pelly certification, Korea ended a decade-long holdout and joined CITES in June 1993, but progress has slowed since then.
- We are cooperating with the CITES Secretariat in efforts to convince Middle Eastern countries (Yemen, Oman, and the United Arab Emirates) to stop the trade in rhino horn dagger handles, and Southeast Asian countries (Viet Nam, Cambodia, and Laos) to stop the movement of tigers, leopards, orangutans, and other endangered species through their markets. One result of these efforts is Viet Nam's recent decision to join CITES. We hope Viet Nam's action will influence its neighbors to follow suit.

While these activities continue, the Fish and Wildlife Service is preparing to serve as host for the next CITES Conference of the Parties in Ft. Lauderdale, Florida, in November 1994. Issues involving not only tigers and rhinos, but also minke whales, African elephants, box turtles, crocodiles, marine fishes, tropical timber, and many other wildlife resources will be debated by an estimated 3,000 delegates from all over the world. Future editions of the *Bulletin* will address these issues as the meeting grows closer.

Marshall Jones is Chief of the Fish and Wildlife Service Office of CITES Management Authority. He also Chairs the Interagency Coordinating Committee involved in the November Conference of the Parties in Florida.

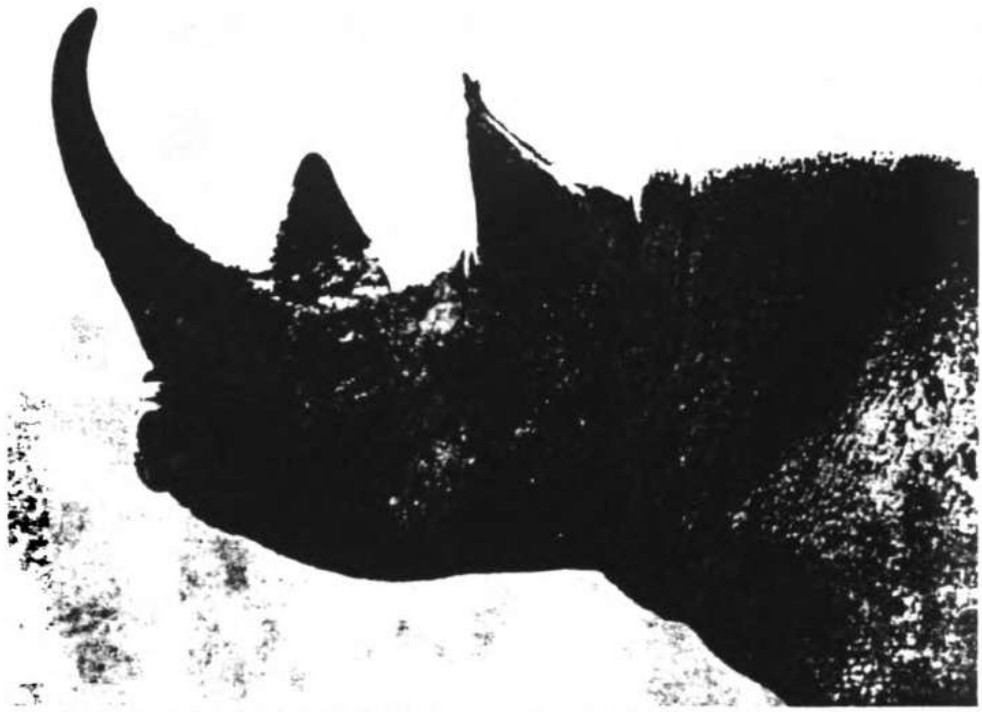

photo by Bruce Wolfe, World Wildlife Fund - U.S.

The World Wildlife Fund estimates that the population of the black rhino has fallen to fewer than 2,000, due primarily to poaching for the animal's horn.

"The Power of Pelly":

FWS Director Mollie Beattie, testifying May 17 before the House Committee on Merchant Marine and Fisheries, expressed support for the "spirit and intent" of H.R. 3987, the Rhinoceros and Tiger Conservation Act of 1994, a bill co-sponsored by Congressman Jack Fields (R-TX) and Congressman Anthony Beilenson (D-CA), and its Senate counterpart, sponsored by James Jeffords (R-VT). H.R. 3987 would establish a rhino and tiger conservation fund, as well as institute a new review of countries involved in the trade of these seriously endangered animals.

However, Director Beattie also cited the effectiveness of the current Pelly Amendment authority. "We have learned," she said, "sometimes it is the power of Pelly certification alone, without recourse to actual sanctions, that has been enough to change a country's policies."

The Siberian Tiger Project: Saving Endangered Species Through International Cooperation

by Howard Quigley and Maurice Hornocker

A few years ago, people in a number of countries were surveyed on their general knowledge about wildlife. The survey crossed cultural, political, and economic boundaries. Of the six or eight species with the highest index of recognition, almost half were endangered species. The giant panda, the rhinoceros, and the tiger were on that list, and although all three are the focus of major international efforts to save them from extinction, they continue to decline. It is in Russia where we hope to reverse this trend for at least one of the subspecies of tigers, the Siberian tiger *(Panthera tigris altaica).*

Over the past 5 years, through the Hornocker Wildlife Research Institute at the University of Idaho, we have mounted a major research and conservation effort to save this great cat, known also as the Manchurian or Amur tiger. Five years ago, the estimated number of Siberian tigers in Russia was approximately 500, and very little was known in the West about the subspecies. Around a campfire in a central Idaho wilderness area with members of the then-Soviet Academy of Sciences, we proposed a research project to examine the ecology of this cat in depth. The response was, "Ngét problem." Over the next 2 years we organized the field project.

The goal of the project from the beginning has been to describe the ecology of the tiger in detail and apply those findings to the conservation of the cat and its native habitat. Russian biologists had been studying the tiger for several years and had accumulated impressive banks of information. But the data were limited by one fact: tigers could not be followed consistently when there was no snow on the ground for tracking. Thus, the picture of the Siberian tiger's behavior was quite good from about the end of October to the end of March. But outside of those months, only spotty information existed. To understand the cat, and to find answers to help in its conservation, the entire picture had to be put together. In 1989, we proposed to fill those gaps and formed a field team of Russians and Americans to do just that. The initial problem was funding; although the Russian scientific community was supportive and eager to be involved, it could not supply monetary support.

With borrowed money, we made two organizational trips to Russia. In the meantime, two organizations — the National Geographic Society and the National Fish and Wildlife Foundation — came forward with matching funds to start the project. Field operations began in January 1992. Subsequently, additional funding from the Exxon Corporation, the National Wildlife Federation, and private contributors have kept project activities moving.

There are eight recognized subspecies of tigers, three of which are believed to be extinct. The main feature distinguishing the Siberian tiger from its cousins is its great size. With males reaching recorded weights over 700 pounds in the wild, this subspecies is the largest of all felids. To secure the

(continued on next page)

photo © by Michael P. Day, President, The Tiger Trust

A species that is the focus of an international effort to save it from extinction, this Siberian tiger cub is also a poignant representation of an immediate problem. Poachers orphaned the cub by shooting his mother who "probably wound up on a pharmacy shelf."

The Siberian Tiger Project at the Hornocker Wildlife Research Institute, University of Idaho, has been working with several Russian agencies to study the ecology of the species and to develop a conservation plan. Now, to complement the habitat preservation initiative, the emphasis is on anti-poaching efforts through acquiring "boots, bullets, and vehicles for park guards in Russia," says Project Co-Director Howard Quigley. Adds Dr. Quigley, "We will have a conservation plan in place, but if we don't halt poaching, there won't be any tigers to save. We could lose the largest cat in the world in the next few years."

In 1992, the Siberian Tiger Project rescued four cubs similarly orphaned. Today, the two surviving cubs, a male and a female, are doing well. Named Khuntami, for a landmark in the Sikhote-Alin Biosphere Reserve of Russia, the male cub is at the Omaha Zoo and now weighs more than 250 pounds. The female Nadezhda, whose name in Russian means "hope," is at the Indianapolis Zoo and weighs almost 200 pounds.

photo by Siberian Tiger Project Field Coordinator Dale Miquelle

Co-Director of the Siberian Tiger Project at the University of Idaho's Hornocker Wildlife Research Institute, Dr. Howard Quigley checks the radio collar on Tiger #1, nicknamed Olga, in February 1992. Olga was the first Siberian tiger captured by Russian and U.S. researchers, utilizing combined expertise—Russian tracking experience and U.S. telemetry and tranquilizing capabilities.

Siberian Tiger Project

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future of this cat in the wild was imperative, but it had to be done in Russia; only 10 to 30 were estimated at the time to roam their native home in China, although the historic range of the subspecies extended from Lake Baikal to Beijing.

The Siberian tiger occurs in a region of Russia about which few people in the West have much information. This area basically is bordered by the mouth of the Amur River on the north, and the Chinese and North Korean borders on the south (Miquelle et al., in press), and is known as the Russian Far East. It is roughly equivalent in size and topography to the coast range from San Francisco to Seattle on the west coast of the United States. This part of greater Siberia contains the largest block of contiguous forest in the world, the taiga forest. Although we are focusing on the tiger, the region has great biological diversity.

While Russia generally experiences cold temperatures, the Far East region is a combination of continental and milder maritime climates, strongly influenced by the Sea of Japan and the Pacific Ocean. In contrast to much of the continental climate, the Far East region of Russia obtains most of its precipitation in the spring and early summer from moist southeastern monsoon winds, which can bring more than 6 inches of rain in one day.

This combination of climates promotes a diversity of plants and animals from the northern boreal, Asian, and temperate coniferous life zones. More than 150 species of trees and shrubs exist in Primorye Province (or Krai; Berg, 1950), as well as strange combinations of northern and southern species, such as moose and sika deer, or marten and leopards. Thus, there is more at stake than just tigers.

The tiger, however, can be an effective symbol and tool for the conservation of biological diversity in the Russian Far East. With our team of Russian and American biologists, we continue to gather the information necessary for developing a conservation plan to secure the future of the Siberian tiger. Given the ecological and space requirements of the tiger, the conservation plan will likely secure the future of many other organisms as well. This is the so-called "umbrella effect," which is so often cited when large carnivores are proposed as conservation tools.

But the Siberian Tiger Project is more than ecology, biology, and science. It has been an odyssey of experiences that neither we nor our Russian colleagues dreamed of when we began. The initial months of development, prior to field work, were filled with long negotiating sessions. Like arms negotiators, we were spurred on by some larger vision of moral imperative, although at times we questioned our judgment about taking on this task. When the negotiations stopped, however, and the field work finally got under way, we found the most gratifying and encouraging part of the project: bonding of people for a common cause breaks down the walls of politics and culture.

Since 1992, our American field coordinator, Dale Miquelle, and American assistant, Bart Schleyer, have become part of the community in which they live. They work side-by-side with Russian tiger expert Evgeny Smirnov (see sidebar) and several Russian assistants. We have all been willing to learn about the traditions of each other's worlds. For instance, we had to trust that it really was good for the pores and skin to be whipped by willow branches in a hot sauna, or that a certain tea from native plants would break a fever. And the Russians had to trust that our drugs would keep a tiger asleep while we worked on it, and that it would walk away healthy after we gathered our data and attached a radio-collar.

We are welcomed into the lives, homes, and communities of these people who were once considered our enemies. It is only through this type of integration that a true understanding can be generated. And from understanding and cooperation, we can build an effective conservation plan for the Siberian tiger from the ground level.

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Siberian Tiger Project

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To date, as we begin our third summer of field research, we have captured nine tigers and released them with radio-collars that allow us to follow their movements and activities. We have also caught nine bears, both brown bears *(Ursus arctos)* and Asiatic black bears *(Ursus thibetanus)*, and two Amur leopards *(Panthera pardus orientalis)*. The data from these animals accumulate daily and, with the data, our chances of understanding this ecosystem, as well as ensuring that these animals exist a century from now.

Two threats to tigers are apparent at this point: poaching and loss of habitat. In the past few years, poaching of tigers for the Asian traditional medicinal market has been responsible for the deaths of dozens of Siberian tigers, including one of our adult females. She crossed the road one night at the wrong time and was shot by someone in a passing vehicle. Only her radio collar was found, along with four orphaned cubs (Quigley, 1993).

In Russia, the killing of tigers for money is a relatively new enterprise. Now, there is a heavy price on the tiger's head, the borders are open, and the economic situation is unstable and worsening for most people. The tiger is a tempting target, especially in winter when the animal can be tracked in snow.

For relatively small amounts of money (by Western standards), we feel that effective anti-poaching teams can be put in the field. More than a year ago, we delivered the first donation from the West to help in the anti-poaching effort, and now more support has been coming. The proper organization of these efforts in the coming months will be important to ensure their effectiveness, but we are optimistic.

The second problem is more complex, and requires more time, organization, and energy. Habitat alteration and loss due to overcutting of the forest are a major threat to the future of the Siberian tiger. But the adjustment in the current system of harvesting needed to conserve tiger habitat is simply one of sustainability. The taiga is a tremendous resource for the Russian people. For years, it was harvested at a rate that easily met the internal needs of the country and made little impact on the forest as a whole. But wood has become a precious international commodity that the Russians can sell for foreign currency, which is so important at this time. The big question in Russia is not whether or not to harvest wood, but *how* to harvest it.

We know from our Western experience, for instance, that we can maintain healthy populations of elk *(Cervus elaphus)* and mountain lions *(Felis concolor)* under moderate forest harvesting schemes. However, the type of forestry currently practiced in tiger habitat is hard on tigers and their prey. Timber is either harvested through very large clearcuts, or through intensive selective harvesting. The trees selected are usually important food sources for tiger prey.

We are currently encouraging the maintenance of a controlled harvest area with the construction of a model mill to demonstrate sustainable forestry practices. By doing so, we feel that methods new to Asia can be introduced, and that people will see the value in their implementation. It is a fact that the Russian forests will be harvested. Almost 60 percent of the world's softwood inventory is found in Siberia and the Russian Far East. Economics dictates that this resource will be used. But economics must be tempered with the technology of sustainable use, or a unique Russian heritage — the biological diversity of the Far East — will be lost.

An additional component of our conservation plan will be to assess the current reserve system and its potential for protecting tigers. Our research is showing that the Siberian tiger uses very large blocks of land, several times the size of territories used by the Bengal tiger in Nepal. Although we feel the tiger can tolerate disturbance, fully protected areas will also be as important to tiger conservation as wilderness or protected areas have been for the maintenance of black bear (*U. americanus*) populations in the southeastern United States or mountain lion populations in the West. During the next few years, we will be assessing the reserve system of the Russian Far East through a large-scale, landscape approach, looking at each reserve, the types of nearby land use, and the connectivity between reserves.

Again, all of these activities are conducted through cooperation and teamwork between Americans and Russians. We now employ almost 30 Russians, and they have been integrated into every activity of the Siberian Tiger Project. Training in such activities as the use of radio-telemetry, animal capture and immobilization, and the use of our Geographic Information System is taking place.

Development of a truly comprehensive conservation plan is not an easy task, and when we started this project, many people said it simply could not be done. But after nearly 5 years of preparation, we and our Russian colleagues are ready to move forward to make a future for the Siberian tiger in the wild.

Dr. Maurice Hornocker has conducted and directed research on carnivores for more than 30 years, including original work on mountain lions, bears, and bobcats in North America, and leopards in Africa. He is the former Leader of the FWS Cooperative Wildlife Research Unit at the University of Idaho, and currently is director of the Hornocker Wildlife Research Institute at the University of Idaho.

Dr. Howard Quigley has conducted and directed research on wildlife for 20 years, including mountain lions and black bears in North America, giant pandas in China, jaguars in Brazil, and a number of vertebrates in Guatemala. He currently is president of the Hornocker Wildlife Research Institute. Drs. Hornocker and Quigley are co-directors of the Siberian Tiger Project.

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Russian Rangers Complement International Pressure to Save the Siberian Tiger

by Steven R. Galster

Tracked easily through the deep snow of the Russian Far East, the Amur or Siberian tiger was hit hard by commercial poachers again this winter, pushing the earth's largest cat a big step closer to extinction in the wild. Russian authorities estimate they may have lost 20-25 percent of their tigers between November and March alone, leaving the current number as low as 150-200. Most experts agree that if this trend continues, the Siberian tiger may, for all practical purposes, disappear from the wild within 5 years. Some Russian authorities, pointing to their country's economic situation and tenuous wildlife enforcement structure, give this great predator only 3 years at best, unless political pressure on tiger bone consuming countries continues and support for anti-poaching efforts are stepped up immediately.

Some Russian authorities and wildlife groups have heeded that warning and are teaming up in the Russian Far East to try to stem the tide of commercial poaching, which is devastating not only the Siberian tiger but also bears, deer, seals, and other species whose body parts are being sought for a burgeoning trade in traditional Asian medicines.

Before perestroika and the subsequent opening of the Sino-Soviet border, tiger poachers were held at bay. Commercial trade channels between the Soviet Far East and other countries in demand of tiger bone, such as China, were restricted. Wildlife rangers received enough financial and material support to field a "zone defense" in areas encompassing the tiger's range. After a period of intense poaching in the early part of the century, the population of Amur tigers rose from 40 in 1947 to 370 in 1989.

But post-perestroika Russia, which brought political freedom for most Russian citizens, has spelled disaster for Russian tigers. Unregulated and often illegal trade with other countries, spiralling inflation, corruption, and government austerity measures (such as severe budget reductions) have contributed to a situation in which wildlife poachers and traders can outpace park rangers and policemen. The Ministry of Environment has been forced to reduce its staff of rangers, some of whom make as little as $50 a month. By contrast, commercial poachers can make enough money from their illegal hunting to buy Land Cruisers, vehicles that are very good in the snow and literally enable the poachers to run circles around government cars. The most lucrative of commercial wildlife products have been tiger skins and bones. A whole dead tiger can fetch more than $30,000 on the black market in Taiwan or China. Until recently, little was being done to stop this illegal trade, which has driven tiger populations worldwide to their lowest levels ever.

photo by Dr. Howard Quigley

"Poachers are enemies of nature," says this sign on a road in the Sikhote-Alin Biosphere Reserve in Russia. Note the bullet holes: one response.
(Russian translation courtesy of Peter Ward, Office of International Affairs, U.S. Fish and Wildlife Service.)

In April of this year, President Clinton announced limited economic sanctions against Taiwan for its illegal trade in tiger parts (based on reviews conducted by the Fish and Wildlife Service's Office of Management Authority), and signalled China and South Korea that the U. S. would continue monitoring their progress in enforcing the international tiger trade ban. This was a historic decision, since it is the first time the United States has imposed sanctions on another country under the Pelly Amendment. Several weeks after the announcement, a little known but significant announcement was made in the Russian city of Ussurisk.

Standing in front of a ceremonial burning of confiscated tiger bones and skins in Ussurisk, located on the edge of the taiga in Primorsky Territory, Commander Vladimir Shetinin and 16 rangers launched "Operation Amba," the Russian government's new anti-

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Note from the Field: A Russian Perspective on Tiger Conservation

by Evgeny Smirnov

In the 20th century, the Siberian or Amur tiger has survived four wars, two revolutions, and many hungry people. Wars, revolutions, and crises always impact nature, its fauna first. Like the images in a distorting mirror, the more disturbed the conditions in which people live, the more desperate the situation becomes for wildlife. Perestroika in Russia has had some unfortunate results. Poachers have been killing tigers, bears, deer, and sable with impunity. Figuratively speaking, tigers have contributed to the ABC's of democracy and market economy as their magnificent skins and bones have been sent to China, Korea, and Japan, perhaps even to Paris and San Francisco.

But perestroika also let the scientists of different countries join our protection efforts, and the Russian-American Siberian Tiger Project was the first act in cooperative activity. A group of Hornocker Wildlife Research Institute (USA) researchers and Sikhote-Alin Biosphere Reserve (Primorsky Krai, Russia) researchers have been conducting intensive work on tigers for more than two years. Nine Amur tigers and seven brown and black bears have been wandering the Reserve in their fashionable American collars transmitting important information. A second group of zoologists has been working in the south Primorsky Krai in the Kedrovya Pad Reserve. Their task is even more complicated: to study and to conserve not only tigers but the last ten Far-Eastern leopards. Our plans and thoughts for further conservation efforts are only limited by time and the success of fund raising.

The tiger population is diminishing. How many tigers are there now—300? Tomorrow there may be only 200. It is necessary to stop the marketing of tiger skins and bones. But it also is imperative that we conserve the existing reserves, form new zapovedniks (nature reserves) and national parks, study the biology and ecology of these beautiful cats in detail, and convince hunters, farmers, loggers, economists, politicians, lawyers, and local authorities that tigers have the right to live. And it is necessary to educate this generation and the next. If we can do all this, we can protect not only tigers, but also the Ussuri River basin taiga complex. All people must cooperate as we formulate an Action Plan and develop centers for information and coordination of the efforts.

We have the will *and* we have the tigers, yet.

Evgeniy Smirnov is a biologist with the Sikhote-Alin Biosphere Reserve and Siberian Tiger Project.

Editor's Note: The Fish and Wildlife Service's Office of International Affairs advises that in the past no public access was available to the more strictly controlled zaporedniks. Today, however, several zaporedniks allow ecotourism activities.

Russian Rangers

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poaching program. The tiger is not mentioned directly but is referred to with reverence as "Amba," meaning "Great Sovereign." Funding from the Tiger Trust and the World Wildlife Fund has brought Amba salaries up to $300 a month. Outfitted with new uniforms, equipped with new vehicles, but still short on money for fuel and radios, Amba has begun operation. Consisting of 15 special rangers, a deputy, and a commander, it aims to reduce poaching of the tiger through a two-fold strategy: dispatching patrols quickly to poaching problem areas, and conducting investigations in cities and border areas where wildlife smugglers are known to operate. Amba officers were recruited not only from the park ranger system but also from the military. Reflecting the post-Cold War conversion of some military resources to conservation, there are Amba officers with backgrounds including naval intelligence and army special airborne forces.

Three five-man teams rove constantly through nature reserves and other areas of Primorsky and Khabarovsky Territories, where poaching activity is known to be a problem. Once they are equipped with radios, these brigades will be able to stay in constant touch with one another and their headquarters in Vladivostok, where their commander will be collecting and collating information on poaching and wildlife trading activity. Mikhail Bibikov, Chairman of the Primosky Territory Ecology Committee, hopes to add a fourth or fifth team to Amba if he can raise the money.

Community outreach will also play an important part in Operation Amba's activities. Gathering information from villages that border poaching areas, as well as compensating farmers who have lost livestock to a tiger, are vital to Amba's success. Amba will also be the liaison with Russian non-governmental organizations that have tiger education and protection programs in progress.

Amba is fighting a steep, uphill battle that can only be won if international efforts continue at the political level—such as Pelly action—to stamp out the tiger trade, and if more resources are injected into Amba's efforts on the ground. Current funding for Operation Amba comes from two foreign sponsors, the Tiger Trust of England and the World Wildlife Fund. People who wish to learn more or assist

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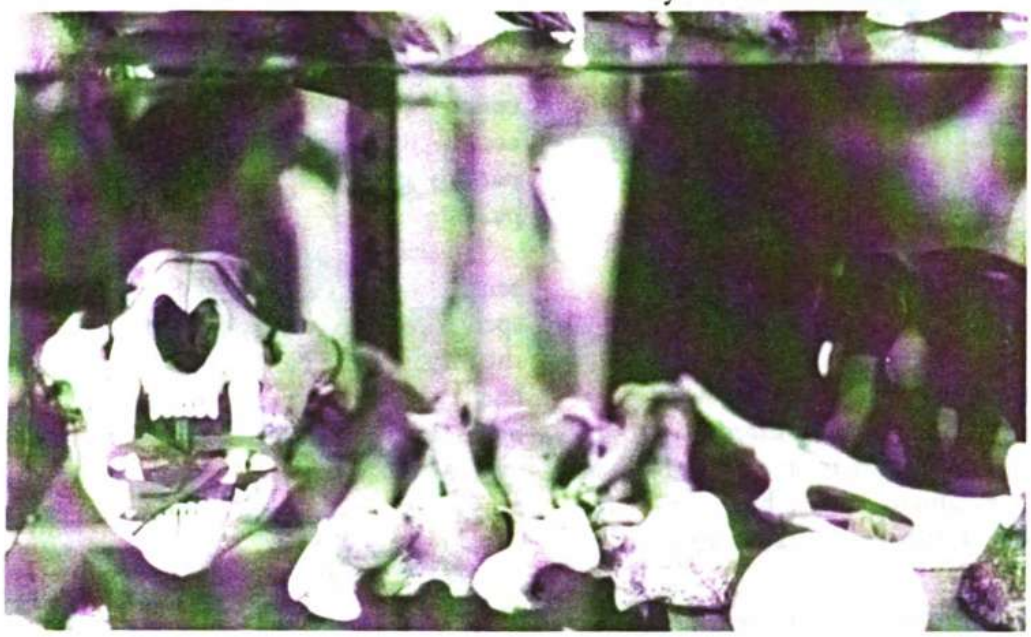
International Cooperation to Save Siberian Tigers: Russia and the United States Intensify Conservation Efforts

by Steven G. Kohl



Tiger skull and bones and rhino horn on a pharmacy shelf in Taipei, Taiwan

In partnership with a number of American zoos, the U.S. Fish and Wildlife Service's Office of International Affairs has been working with its Russian counterparts for more than a decade to promote the conservation of Siberian tigers in the wild and increase the genetic diversity among those held in captivity. In 1983, three young Siberian tigers born in the Moscow Zoo to wild-caught parents were transferred to the New York, Omaha, and Indianapolis Zoos. Since that time, the young have successfully mated with tigers at several facilities to introduce genetic variety and reduce inbreeding.

Endangered in Russia for many years, tigers were strictly protected in three nature reserves (Sikhote-Alin, Lazovskiy, and Kedrovaya Pad) along the southern Pacific coast of the Russian Far East. However, the recent economic difficulties in Russia, exacerbated by poaching and loss of habitat due to timber and logging operations, have brought this magnificent species to the brink of extinction. As a consequence, studies of the Siberian tiger have been reoriented to focus on emergency steps for their protection and management.

In 1990, the Fish and Wildlife Service invited Director Anatoliy Astafyev of Sikhote-Alin Reserve to visit the United States. His meetings with Dr. Howard Quigley of the Hornocker Wildlife Research Institute and representatives of the National Geographic Society resulted in the creation of a project to radio-collar tigers in the Sikhote-Alin Reserve to track their movements and gain a better understanding of their distribution. The project came up against the grim realities of poaching when a transmitter that indicated no movement for several days led to the discovery of four orphaned cubs.

Responding to an appeal from the Russian Ministry of Environmental Protection and Natural Resources, the U.S. Department of State made available an emergency grant to Russia to strengthen ranger and law enforcement activities in the three reserves. The World Wildlife Fund and other private conservation organizations have contributed their own resources and expertise as well, and efforts are under way to assist Russia in saving tigers and their habitat in the unprotected areas linking the three reserves.

Recent articles in *Time* and *National Geographic* magazines, as well as other publications, have focused international attention on the tigers' plight, and many agencies and organizations, including the Fish and Wildlife Service, are promoting efforts to assist Russia. Given the recent sharp decline in tiger abundance in the Russian Far East—estimated to be more than 50% in just the last few years—timely help for this species is of the essence.

Steven G. Kohl, of the U.S. Fish and Widlife Service's Office of International Affairs, administers the Service's exchange programs with Russia and China. Fluent in languages including Russian and Mandarin Chinese, he is U.S. Co-chairman of the Gore-Chernomyrdin Working Group on Biodiversity Conservation and Sustainable Use. This group was created to coordinate U.S.-Russia conservation policy and management issues between the Government agencies of the two countries.

Russian Rangers

(continued from previous page)

Operation Amba can write to either of these organizations:

- The Tiger Trust, New Market, Suffolk, CB8 8TN, England
- World Wildlife Fund, 1250-24th Street, N. W., Washington, D.C. 20037.

Steven R. Galster coordinates "The Investigative Network," an information cooperative linking environmental and human rights investigators worldwide. He recently returned from Russia, where he conducted an investigation of the tiger bone trade for The Tiger Trust.

The National Fish and Wildlife Foundation Goes *Inter*national

by Darv Johnson

The National Fish and Wildlife Foundation (NFWF), a non-profit conservation organization established in 1984, prefers to base its conservation strategy on the need to protect species before they become Threatened or Endangered. To date, however, the NFWF has supported 143 projects dealing with Threatened and Endangered species, of which 36 are international in scope. The NFWF commitment to species recovery on the international level stems in part from the increasing realization that solutions to natural resource conservation problems must be placed in an international context to ensure their effectiveness. The decline of neotropical migratory birds, for example, is due not only to impacts on nesting habitats in the United States, but also to the deforestation and fragmentation of their wintering grounds in Mexico, the Caribbean, and Central America. Jurisdictions and national borders are meaningless in this situation, and a conservation solution will only be successful if these "Partners in Flight" nations are included as full and equal partners.

This multi-national perspective is essential when examining endangered species recovery. Any effort to address the plight of the North Atlantic humpback whale (*Megaptera novaeangliae*) on a strictly national scale will meet with little success because the whale's migratory patterns are not governed by

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U.S. Imposes Trade Sanctions

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Wildlife Service (FWS) believes that most of the world's tiger and rhino populations (except the white rhino in South Africa) will become extinct in the next 2 to 5 years if the trade in these species is not eliminated.

Action to protect these animals accelerated in September 1993. Based on a FWS review of the trade, carried out under the Pelly Amendment to the Fisherman's Protection Act of 1967, Interior Secretary Babbitt certified that Taiwan and the People's Republic of China were engaging in trade that promoted the poaching of rhinos and tigers. Such trade undermines the effectiveness of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), an agreement among 122 countries to prohibit trade in endangered wildlife. In November 1993, President Clinton responded by warning Taiwan and the People's Republic that the U.S. may impose sanctions against them unless "measurable, verifiable, and substantial progress" in eliminating the trade was made by March 1994.

The President's statement suggested a number of actions that Taiwan and the People's Republic could take to demonstrate a commitment to ending the trade in endangered species. These measures, which were based on CITES recommendations, included consolidation and control of stockpiles, formation of a permanent wildlife law enforcement unit with specialized training, development and implementation of a comprehensive law enforcement and education plan, and establishment of regional law enforcement arrangements with neighboring countries. The U.S. offered technical aid to both countries to assist them in their efforts. Additionally, the FWS funded and participated in 3 delegations sent to China and Taiwan over the past 4 months to evaluate the progress in ending the trade.

At a recent meeting, the CITES Standing Committee found that the minimum requirements have not been met by the government of Taiwan, leaving in place the committee's previous recommendation that CITES member countries prohibit the importation of all wildlife (including parts and products) from Taiwan. The President's April 4 action follows this recommendation. On the other hand, the CITES Standing Committee noted that the People's Republic of China has made progress in controlling the trade in endangered wildlife. However, the committee said further actions were needed from China as well as Taiwan to adequately combat the endangered wildlife trade. Therefore, the Pelly Amendment certifications will remain in effect for both countries. Their progress will be evaluated again in December 1994, at which time sanctions against Taiwan could be lifted or strengthened, and the decision not to sanction China will be reassessed.

A notice was published in the April 28, 1994, *Federal Register* to solicit public comments on the range of otherwise legal wildlife specimens and products to be covered by the import prohibitions. Examples of items that could be targeted include jewelry made from coral and mollusk shells, and leather products fashioned from snake, lizard, and crocodile hides.

Additional information is available from the U.S. Office of CITES Management Authority, Fish and Wildlife Service, 4401 North Fairfax Drive, Room 420-C, Arlington, Virginia 22203.

The Endangered humpback whale (Megaptera novaeangliae) is a perfect example of a species that will benefit from a coordinated, multi-nation conservation effort. This humpback is shown enjoying the Stellwagen Bank National Marine Sanctuary in the Gulf of Maine, three miles off the northern end of Cape Cod, Massachusetts.

The NFWF goes *International*

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national boundaries. Similarly, North America's stocks of Atlantic salmon (*Salmo salar*), petitioned for listing in the United States, cannot be restored without the cooperation of the Greenland fishermen who catch 235 tons of the salmon each year. In the Gulf of California, efforts to conserve the Gulf of California harbor porpoise (*Phocoena sinus*) and a fish, the totoaba (*Cynoscion macdonaldi*), depend on the cooperation of Mexican conservation interests.

The NFWF strategy in these instances is to work cooperatively with multi-national partners to develop the best possible management solution. To address the pressures facing the humpback whale, NFWF is supporting a three-year research project guided by the Center for Coastal Studies in which scientists from seven nations will pool data gathered at sea, thereby creating a solid scientific foundation for future understanding and management of this species. In the case of the Atlantic salmon, the result was a two-year buyout of the West Greenland commercial salmon quota, enabling large percentages of these fish (more than 120,000 annually) to return to their native North American rivers and spawning grounds.

With a population roughly four times that of the United States in an area one-third the size, India's natural resources are under enormous pressure. Any conservation initiative in India, therefore, is that much more difficult to undertake. The first NFWF venture in that region comes through a fund established in partnership with the U.S. Fish and Wildlife Service to support conservation activities in the Near East and South Asia regions. Through our partnership with the Wildlife Institute of India and other conservation organizations in the area, NFWF will reap the benefits of their experience with recovery efforts for such endangered species as the tiger (*Panthera tigris*), snow leopard (*Panthera uncia*), and Indian wolf (*Canis lupus pallipes*) in a climate of intense population pressure.

Similarly, NFWF's support of Siberian tiger (*Panthera tigris altaica*) research in the former Soviet Union has proven to be a rare chance for a US/Russia team to study and develop a conservation plan for the world's largest cat. These cooperative efforts represent an enormous opportunity for nations to exchange scientific data and management techniques, and may prove to be of value in directing our conservation efforts on the domestic front.

The NFWF has also offered support for international wildlife law enforcement efforts, such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and the World Wildlife Fund's "Buyer Beware" programs. NFWF has provided three grants in support of CITES, including training for Chinese scientists on implementation of CITES programs. The "Buyer Beware" campaign promotes awareness of priority international wildlife trade issues through public service announcements, publications, brochures, and other projects.

Unfortunately, the need for the protection of endangered species on an international level continues to grow. This fall, the biennial CITES conference will be held in the United States for the first time in 20 years, presenting a tremendous opportunity for U.S. involvement in these conservation and enforcement efforts to increase. Through this conference, and through support of international endangered species work, NFWF will continue to encourage the exchange of scientific data management techniques and approaches. With this exchange, individual countries and communities can begin to implement increasingly effective endangered species programs, and shift gears from reactive to proactive species management.

For more information, write to the NFWF at 1120 Connecticut Avenue, N.W., Suite 900, Washington D.C. 20036, or call (202) 857-0166.

Darv Johnson recently joined the National Fish and Wildlife Foundation, where he works on the development and marketing staff. His article is the first the Bulletin has received via Internet.

Siberian Tiger Project

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Old-Growth Forests and the Puerto Rican Parrot

by J. Michael Meyers

The Puerto Rican parrot (*Amazona vittata*) is an extremely endangered cavity-nesting species. Fewer than 40 parrots inhabit the forests of the Luquillo Mountains. The birds have nested predominantly in palo colorado (*Cyrilla racemiflora*) since the early 1970's. Palo colorado, or titi as it is known in the southeastern United States, is a small tree (less than 0.3 meter, or 1.0 foot, in trunk diameter) through most of its range, which extends from the swamps of North America to Brazil. In the rain forests of Puerto Rico, however, palo colorado reaches mammoth sizes, as large as 2.6 meters (8.5 feet) in diameter.

photo by Pete Weaver, International Institute of Tropical Forestry, U.S. Forest Service

The Puerto Rican parrot, a cavity nesting bird, most often uses old-growth trees such as this ancient palo colorado.

According to Pete Weaver, a forester with the U.S. Department of Agriculture's International Institute of Tropical Forestry who has studied the palo colorado extensively in Puerto Rico, this species is a slow-growing tree that probably is an average of 660 years old when its diameter reaches 1.0 meter (3.3 feet). The palo colorado trees used by Puerto Rican parrots for nesting average 1.1 meter (3.6 feet) in diameter, which means these trees may be more than 700 years old.

Puerto Rican parrots have used only two other tree species for nesting since the 1970's. One nest in 1974 was in a large laurel sabino (*Magnolia splendens*) tree.[1] Another nest, used every year since 1991, is in a tabonuco (*Dacryodes excelsa*) tree (F. J. Vilella, U.S. Fish and Wildlife Service, pers. commun.).

Puerto Rican parrots obviously use old-growth forests. However, Weaver and others believe that palo colorado is a late secondary species that may need openings in the forest for successful reproduction. This means palo colorado forests need periodic disturbances to maintain their population and replace older trees as they die. The most recent such disturbance was in 1989, when Hurricane Hugo struck Puerto Rico. However, studies of potential nesting trees by the Puerto Rico Research Group of the National Biological Survey after the hurricane revealed that on the eastern side of the parrot's nesting range, palo colorado may not be replacing itself. The hurricane killed 22 percent of the palo colorado that were potential nesting trees in the eastern mountains (personal observation). It is also in this area that a new nest was discovered in a tabonuco tree in 1991 (personal observation).

There may be enough nesting cavities for the parrot population in the short term; however, as the population increases, a shortage of nesting sites could develop. A hurricane even stronger and more devastating than Hugo may occur at any time and destroy more parrot nesting trees. Because it takes more than 660 years to produce optimum palo colorado trees for nesting parrots, and there are no other areas in Puerto Rico with old growth forests like those of the Luquillo Mountains, growth of the parrot population could become limited by the supply of suitable nesting trees.

Can nesting traditions change? Birds have been known to alter their nesting patterns if they successfully raise young at new nesting sites.[2] Research and management of potential nesting habitat may be able to expand the parrot's use of trees that are more common and widespread than palo colorado. Tabonuco and other large trees in Puerto Rico could provide nesting habitat if cavities in these trees suitable for parrot nesting are created or enhanced. With the successful management effort conducted by the Fish and Wildlife Service and the Forest Service, the parrot population could approach 80-100 individuals by the turn of the century. Encouraging new nesting traditions may be the key to increasing the population and achieving the goals of the Puerto Rican parrot recovery program.

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Listing Proposals — February/March 1994

Thirty-nine species — 37 animals d 2 plants — were proposed by the sh and Wildlife Service during Feb- ary and March 1994 for listing as ıdangered or Threatened. If the list- g proposals are approved, Endangered ıecies Act protection will be extended the following:

acific Pocket Mouse *(Perognathus longimembris acificus)*

This tiny mammal had not been :en in over 20 years until recently, hen a small population was rediscov- red at a site on the Dana Point leadlands, a historically occupied site nd a remnant of undeveloped habitat ı Orange County, California. One ocumented threat to the mice is pre- ation by domestic and/or feral cats. he most immediate danger, however, a proposed hotel and residential omplex, which would destroy almost l 3.75 acres (1.5 hectares) of occu- ied habitat. For this reason, the FWS ublished a temporary emergency rule ı February 2, protecting the Pacific ocket mouse for 240 days as an En- ngered species. During that time, ıe FWS will consider a proposal — so published February 2 — to give ıe animal long-term protection.

Pacific pocket mice cannot survive ı developed areas. They historically ccurred within such natural habitats s coastal dunes, river alluvium, and oastal sage scrub growing on marine erraces. Once, populations were nown from eight areas in three south- rn California counties. In Los ngeles County, however, only about 1 ercent of Pacific pocket mouse habi- at remains. Land use patterns in San Diego County are similar. Approxi- nately 150 acres (60 hectares) of abitat in Orange County are still un- eveloped, but surveys have found he mouse only at the small Dana oint Headlands site.

photo by B. "Moose" Peterson/WRP

Pacific pocket mice, which cannot survive in developed areas, now inhabit an area of less than 4 acres.

The coastal California gnatcatcher *(Polioptila californica californica)* occurs at the same site. This habitat, however, is not within an area proposed for conservation under the State of California's Natural Communities Conservation Planning Program.

California Red-legged Frog *(Rana aurora draytonii)*

The largest native frog in the western United States, the California red-legged frog is found primarily in wetlands and streams in coastal drainages. This subspecies requires a fairly distinct habitat, combining specific aquatic and riparian components. Adults depend on dense vegetation associated with deep, still or slowly moving water.

Once widely distributed, the frog occurred in California from Marin County coastally, and from Shasta County inland, southward to northwestern Baja California, Mexico. But habitat loss or alteration, combined with overexploitation and the introduction of exotic predators, has eliminated the frog from 75 percent of its historical range in California. Most of the wetlands the subspecies once inhabited have been diked, drained, or filled for agricultural and urban development. Other habitats disappeared when streams were channelized, diverted, or inundated by impoundments. Cattle grazing, off-road vehicle use, and logging in red-legged frog habitat also have damaged riparian vegetation and degraded the aquatic environments with siltation.

In the 1800's, California red-legged frogs were considered a delicacy. From 1890 to 1900 alone, up to 80,000 were taken each year to supply the San Francisco market. Around 1900, however, there was a dramatic fall in the numbers collected, indicating that the frog had fallen victim to overharvest. Today, the frog's main predators are introduced fishes and another non-native species, the bullfrog.

Known populations of the California red-legged frog larger than 350 individuals remain in only three areas: Pescadero Marsh Natural Preserve in coastal San Mateo County, Point Reyes National Seashore in Marin County,

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photo by B. "Moose" Peterson/WRP

The California red-legged frog is the largest native frog in the western United States.

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and canals west of San Francisco International Airport. Because of the frog's seriously reduced numbers and range, and the continuing threats, the Service proposed February 2 to list this subspecies as Endangered.

Two California Butterflies

Two butterflies native to central and northern California were proposed February 4 for listing as Endangered. Both have a typical wingspan of about 55 millimeters (2.17 inches), and are orange-brown in color with silver and black spots on their undersides. They have a limited range:

- **Callippe silverspot** ***(Speyeria zerene behrensii)*** - Historically, the Callippe silverspot inhabited native grasslands in seven areas of the San Francisco Bay region. Only two populations remain, in a city park and on San Bruno Mountain in San Mateo County.
- **Behren's silverspot** ***(Speyeria zerene behrensii)*** - A related subspecies, this butterfly once was found on coastal prairie habitat from the mouth of the Russian River in Sonoma County north along the coast to southern Mendocino County in the vicinity of Point Arena. Its six former populations have been reduced to one, which occurs near Point Arena.

Extensive habitat modification or destruction is the main reason for the decline of these butterflies. Some populations were displaced by residential and commercial development. Others disappeared when off-road vehicle use, unsuitable levels of grazing, trampling, and invasions of non-native plants eliminated the foodplants of the butterfly larvae or the nectar sources for the adults. The remaining populations are vulnerable to further habitat change and overcollecting. There is an extensive commercial trade in both taxa, which are highly prized by butterfly collectors.

Alameda Whipsnake *(Masticophis lateralis euryxanthus)*

Included with the proposed rule to list the two silverspot butterflies was a proposal to list the Alameda whipsnake — which inhabits the same general region — as Endangered. This slender, extremely fast-moving snake has a relatively large head, which it holds off the ground in a cobra-like manner to peer over grass or rocks as its hunts lizards. Alameda whipsnakes, which are non-venomous, have a dark brown or sooty back with distinct yellow-orange stripes down the sides. They reach about 4 feet (1.2 meters) in length.

The Alameda whipsnake inhabits the inner coast range in Contra Costa and Alameda Counties, where it usually is found within northern coastal scrub or chaparral. Historically, the snake was known from 60 locations, but only 25 populations remain. Like the two butterflies, it faces loss of habitat from a variety of sources.

Barton Springs Salamander *(Eurycea sosorum)*

This small amphibian, found only in the Barton Springs system in central Texas, is entirely aquatic. It does not metamorphose into a terrestrial form, but retains its bright red external gills throughout its life. The dorsal coloration varies from pale purplish-brown or gray to yellowish-cream. Irregular pigmentation gives the salamander a mottled, "salt and pepper" pattern.

Barton Springs consists of a complex of springs in Zilker Park, owned by the City of Austin. Three of the system's four springs are inhabited by the salamander. All three have been impounded for swimming, which itself does not seem to have harmed the salamander. The main threat to the species is water pollution. Barton Springs has good water quality most of the time, but it is vulnerable to degradation from any contaminants that drain into the aquifer and degrade the ground water. Less than 5 percent of the system's 150 square mile (390 square kilometer) recharge zone has been developed so far. As development in this rapidly growing part of Texas continues, so does the potential for a catastrophic chemical spill or chronic degradation from urban runoff. If the salamander is listed, the recovery effort could include measures to prevent and/or control pollution during and after development.

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photo by Wyman Meinzer

The mottled pigmentation of the Barton Springs salamander is accented by its bright red external gills.

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Any contaminants released into the recharge area, which is part of the Edwards Aquifer, could make their way to Barton Springs. The Texas Water Commission has identified the Edwards Aquifer as one of the most sensitive aquifers in Texas to ground water pollution. Loss of water quality poses a threat not only to the salamanders but also the amphipods upon which they feed. The vulnerability of the Barton Springs salamander is exacerbated by its restricted range.

The salamander faces several other potential threats as well, including groundwater depletion and disturbance of the habitat by the use of chemicals and high-pressure hoses for pool cleaning. Accordingly, the FWS proposed February 17 to list the Barton Springs salamander as Endangered.

San Xavier Talussnail *(Sonorella eremita)*

As its common name indicates, this land snail lives in talus slope habitat not far from San Xavier, a town in Pima County, Arizona. It has an extremely restricted range: a 50- by 100-foot (15- by 30-meter) site on the northwestern side of a hill where limestone and decomposed granite have formed a deep rock slide. The species is known nowhere else.

San Xavier talussnails have a globose, whorled shell about 19 millimeters (0.7 inches) in diameter and white to pinkish in tint, accented by a chestnut-brown band. They can estivate (remain dormant) for up to 3 years, and in most years are active only 3 or 4 days. Dormancy helps the snails survive in the Sonoran Desert climate. The moist conditions this species needs when active are maintained by surface vegetation, the deep talus, and the shelter of the hill itself.

Because of the species' very limited distribution and specific moisture requirements, the San Xavier talussnail is vulnerable to relatively small-scale changes in its environment. Future activities on nearby lands could have an impact on the species' environment. As a precaution, the FWS proposed March 23 to list the San Xavier talussnail as Endangered.

Thirty African Birds

After evaluating listing petitions from the International Council for Bird Preservation, the FWS proposed March 28 to list 30 species of African birds as Endangered (E) or Threatened (T):

- **Amsterdam albatross** ***(Diomedia amsterdamensis)*** - a large seabird that breeds only on Amsterdam Island, a French possession in the southern Indian Ocean. Only 5 pairs were known to breed each year in the 1980's. (E)
- **Thyolo alethe** ***(Alethe choloensis)*** - a small, ground-dwelling bird known only from submontane evergreen forest in Malawi and Mozambique. About 1,500 pairs are estimated to survive. (E)
- **Uluguru bush-shrike** ***(Malaconotus alius)*** - a small predatory bird occurring in the Uluguru Mountains of central Tanzania. Although rare, its numbers have not been quantified. (T)
- **Madagascar serpent eagle** ***(Eutriorchis astur)*** - a raptor related more to harriers than eagles. The continued existence of this extremely rare bird was confirmed when a specimen was captured and released in January 1994. (E)
- **Mauritius fody** ***(Foudia rubra)*** - a small weaver bird known only from the island of Mauritius in the Indian Ocean. A large-scale logging project has reduced the population to an estimated 150 breeding pairs. (E)
- **Rodrigues fody** ***(Foudia flavicans)*** - a related species endemic to the island of Rodrigues, part of the nation of Mauritius. By the 1980's, only about 100 individuals remained. (E)
- **Djibouti francolin** ***(Francolinus ochropectus)*** - a ground-dwelling, partridge-like bird restricted to highland forests in the country of Djibouti. By 1985, only about 1,500 birds were known to survive. (E)
- **freira** ***(Pterodroma madeira)*** - a small seabird native to the mountains of Madeira, an island possession of Portugal in the Indian Ocean. Only 20 breeding pairs may remain. (E)
- **Alaotra grebe** ***(Tachybaptus rufolavatus)*** - a small diving bird occurring primarily at Lake Alaotra and adjacent marshes in Madagascar. Human alteration of its limited habitat has promoted a tremendous increase in numbers of the related little grebe *(T. ruficollis)*, resulting in extensive hybridization. (E)
- **white-breasted guineafowl** ***(Agelastes meleagrides)*** - a medium-sized ground-dwelling bird related to turkeys and peacocks. Overexploitation of its rainforest habitat has reduced this species to small numbers in the Ivory Coast and Liberia. (E)
- **Raso lark** ***(Alauda razae)*** - a songbird known only from Raso, one of the islands in the nation of Cape Verde off the west coast of Africa. This once common species had declined to 150 individuals at last count. (E)

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photo by Martin Babe/The Peregrine Fund

According to The Peregrine Fund, this is the first photograph ever of a live Madagascar serpent eagle. It was captured in January 1994, fitted with a miniature radio transmitter, and released. Researchers are monitoring the bird to learn more about its behavior and ecology.

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• **Madagascar sea-eagle** ***(Haliaeetus vociferoides)*** - a fish-hunting species related to the American bald eagle. Only 96 individuals were counted during the mid-1980's on the island of Madagascar. (E)

• **Ibadan malimbe** ***(Malimbus ibadanensis)*** - another small weaver about the size of a house sparrow. This species, which is restricted to southwestern Nigeria, was once widespread but is now very rare. (E)

• **Algerian nuthatch** ***(Sitta ledanti)*** - a small arboreal bird found only on Mount Babor in northern Algeria. Deforestation had reduced this species to about 80 pairs by the 1980's. (E)

• **Canarian black oystercatcher** ***(Haematopus meadewaldoi)*** - a shorebird somewhat like a rail that is known only from the eastern Canary Islands, a Spanish possession off northwestern Africa. Although it is uncertain if this species still exists, four apparently genuine sightings in recent years have given biologists hope. (E)

• **Seychelles lesser vasa parrot** ***(Coracopsis nigra barklyi)*** - a dark brown parrot endemic to Praslin, one of the islands in Seychelles, a nation off the east coast of Africa. By the 1980's, destruction of its palm forest habitat reduced the species to about 100 birds. (E)

• **Mascarene black petrel** ***(Pterodroma aterrima)*** - a small seabird native to the islands of Reunion and Rodrigues, which are part of the nation of Mauritius. It had been eliminated from Rodrigues by the 18th century and is very rare on Reunion. (E)

• **pink pigeon** ***(Nesoenas mayeri)*** - a bird about the size of the domestic pigeon but generally pink in color. This species, which is restricted to southwestern Mauritius, has declined to about 20 birds in the wild, although there are large numbers in captivity. (E)

• **white-tailed laurel pigeon** ***(Columba junoniae)*** - a large pigeon known only from the Canary Islands. Destruction of the endemic Canarian laurel forests has reduced this bird in numbers and range. (T)

• **Madagascar pochard** ***(Aythya innotata)*** - a diving duck apparently confined to freshwater lakes and pools in the north-central plateau of Madagascar. Although common as recently as 1930, this bird is now on the brink of extinction. Until a single specimen was captured in 1991, it had not been seen since 1970 . (E)

• **dappled mountain robin** ***(Modulatrix orostruthus)*** - a thrush recorded from three remnants of montane forest in Mozambique and Tanzania. The Mozambique population has not been located since 1932, and those in Tanzania may number in the low thousands. (T)

• **Marungu sunbird** ***(Nectarinia prigoginei)*** - a nectarivorous bird comparable to hummingbirds. It occurs only in the Marungu Highlands of southeastern Zaire. (E)

• **Taita thrush** ***(Turdus helleri)*** - a dark-colored, ground-dwelling bird apparently confined to the highlands of southeastern Kenya. The only well-known population contains several hundred individuals. (E)

• **Bannerman's turaco** ***(Tauraco bannermani)*** - a greenish parrot with a conspicuous crest. This bird is found in the Bamenda-Banso Highlands of western Cameroon, where its forest habitat is rapidly being cleared. (E)

• **Seychelles turtle dove** ***(Streptopelia picturata rostrata)*** - a bird generally dark grayish purple in color and somehwat smaller than the domestic pigeon. This subspecies declined through hybridization after a related taxon was introduced from Madagascar in the mid-19th century. The Seychelles turtle dove may still occur in at least a relatively pure form on Cousin Island. (E)

• **Pollen's vanga** ***(Xenopirostris polleni)*** - a predatory bird somewhat similar to the shrikes. It is rare but still relatively widely distributed in the remaining rainforests of eastern Madagascar. (T)

• **Van Dam's vanga** ***(Xenopirostris damii)*** - a similar bird that is restricted to a single area of northwestern Madagascar but still exists in fairly good numbers. (T)

• **Aldabra warbler** ***(Nesillas aldabranus)*** - a small songbird found only on Aldabra, an island in the nation of Seychelles. The International Council for Bird Preservation called the Aldabra warbler the "rarest, most restricted, and most highly threatened species of bird in the world." Discovered only in 1967, it is confined to about 25 acres (10 hectares) of coastal vegetation. Its habitat is being destroyed by introduced animals (rats, which also prey on the nests, and goats). (E)

• **banded wattle-eye** ***(Platysteira laticincta)*** - a small flycatcher characterized by pale plumage and a wattle of bare red skin above the eye. It is known only from the Bamenda Highlands of western Cameroon, where its forest habitat is rapidly being cleared. (E)

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• Clarke's weaver *(Ploceus golandi)* - a bird recorded only from a small forested area on the southeastern coast of Kenya. At the current rate of logging, its habitat could be eliminated within 15 years. (E)

All 30 of the birds are restricted in range and face habitat destruction, overhunting, predation by introduced animals, and/or genetic swamping. Most have suffered serious losses in recent years. Although the Endangered Species Act cannot prohibit the take of foreign species or the loss of their habitat, it does regulate their importation into the United States. The Act also authorizes the U.S. to provide training assistance, personnel, and limited financial assistance to other countries.

Parish's Alkali Grass *(Puccinellia parishii)*

Parish's alkali grass, an ephemeral, dwarf annual growing only at permanent alkaline springs and seeps, is restricted to widely scattered sites within desert habitat in the southwest. At present, 10 populations are known — 7 on Navajo and Hopi lands in Arizona, 1 on private land in New Mexico, and 2 on private and Department of Defense lands in California. Most of the sites are very small. The Arizona populations, for example, occupy a total area of about 0.2 acre (0.1 hectare).

The moist habitat of Parish's alkali grass is vulnerable to damage from any activities that alter the site hydrology. Water diversions or impoundments, construction, excess groundwater pumping, and conversion to cropland are among the threats to this plant. One population also was deliberately destroyed. Because of the species' very limited distribution, Parish's alkali grass is believed vulnerable to extinction. On March 28, the FWS proposed listing it as Endangered.

Gesneria pauciflora

Another rare plant dependent on constant moisture is *Gesneria pauciflora*, a small shrub endemic to Puerto Rico that lacks a common name. This member of the family Gesneriaceae is an attractive species, with glossy, dark green, trowel-shaped leaves and yellow to yellow-orange flowers. The plants grow in stream beds on wet serpentine rock. Two populations are known, and they contain a total of just over 1,000 individuals.

Both sites are located within the Maricao Commonwealth Forest. Because the plants are restricted to mountain streambeds, their habitat may be vulnerable to damage from rockslides and floods. Forest management activities such as trail construction also could pose a threat if the species' habitat is not taken into account. It is not known if *G. pauciflora* was more widely distributed before the large-scale deforestation of Puerto Rico in the late 1800's and early 1900's. According to the Center for Plant Conservation, *G. pauciflora* could become extinct within the next 5 years if it is not protected. In light of the species' precarious status, the FWS proposed February 18 to list it as Threatened.

* * *

Available Conservation Measures

Among the conservation benefits authorized for Threatened and Endangered plants and animals under the Endangered Species Act are: protection from being jeopardized by Federal activities; restrictions on take and trafficking; a requirement that the FWS develop recovery plans and take conservation actions; authorization to seek land purchases or exchanges for important habitat; and Federal aid to State and Commonwealth conservation departments with cooperative endangered species agreements. Listing also lends greater recognition to a species' precarious status, encouraging other conservation efforts by State and local agencies, independent organizations, and concerned individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they fund, authorize, or carry out are not likely to jeopardize the survival of any Endangered or Threatened species, or to adversely modify its designated Critical Habitat (if any). When an agency finds that one of its activities may affect a listed species, it is required to consult with the FWS to avoid jeopardy. If necessary, "reasonable and prudent alternatives," such as project modifications or rescheduling, are suggested to allow completion of the proposed activity. Where a Federal action may jeopardize the survival of a species that is *proposed* for listing, the Federal agency is required to "confer" with the FWS (although the results of such a conference are not legally binding).

Additional protection is authorized by section 9 of the Act, which makes it illegal to take, import, export, or engage in interstate or international commerce in listed animals except by permit for certain conservation purposes. The Act also makes it illegal to posses, sell, or transport any listed species taken in violation of the law. For plants, trade restrictions are the same but the rules on "take" are different. It is unlawful to collect or maliciously damage any Endangered plant on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law, or in the course of violating a State criminal trespass law, also is illegal under the Act. In addition, some States have more restrictive laws specifically against the take of State or federally listed plants and animals.

Final Listing Rules — February/March 1994

Final rules to list the following 66 plant and animal species as Endangered (E) or Threatened (T) were published in February and March 1994:

56 Hawaiian Plants

Three listing packages addressing unique plants of the Hawaiian Islands were published during this period. The first, published February 25, listed 24 plant taxa found primarily on the island of Kaua'i. The Hawaiian names, if any, follow the scientific names:

- ***Brighamia insignis***, or 'olulu - a succulent in the bellflower family (Campanulaceae); E
- ***Cyanea asarifolia***, or **haha** - a shrub in the bellflower family; E
- ***Delissea rhytidosperma*** - a shrub in the bellflower family; E
- ***Diellia pallida*** - a fern in the spleenwort family (Aspleniaceae); E
- ***Exocarpos luteolus***, or **heau** - a shrub in the sandalwood family (Santalaceae); E
- ***Hedyotis cookiana***, or **'awiwi** - a shrub in the coffee family (Rubiaceae); E
- ***Hibiscus clayi*** - a shrub or tree in the mallow family (Malvaceae); E
- ***Lipochaeta fauriei***, or **nehe** - a perennial herb in the aster family (Asteraceae); E
- ***Lipochaeta micrantha***, or **nehe** - a perennial in the aster family; E
- ***Lipochaeta waimeaensis***, or **nehe** - a perennial in the aster family; E
- ***Lysimachia filifolia*** - a shrub in the primrose family (Primulaceae); E
- ***Melicope haupuensis***, or **alani** - a tree in the citrus family (Rutaceae); E
- ***Melicope knudsenii***, or **alani** - a tree in the citrus family; E
- ***Melicope pallida***, or **alani** - a tree in the citrus family; E
- ***Melicope quadrangularis***, or **alani** - a shrub or small tree in the citrus family; E
- ***Munroidendron racemosum*** - a tree in the ginseng family (Araliaceae); E

photo by Joby Rohrer

Clermontia lindseyana

- ***Nothocestrum peltatum***, or **'aiea** - a tree in the nightshade family (Solanaceae); E
- ***Solanum sandwicense***, or **popolo'aiakeakua** - a large shrub in the nightshade family; E
- ***Phyllostegia waimeae*** - a climbing perennial in the mint family (Lamiaceae); E
- ***Pteralyxia kauaiensis***, or **kaulu** - a tree in the dogbane family (Apocynaceae); E
- ***Schiedea spergulina* var. *leiopoda*** - a shrub in the pink family (Caryophyllaceae); E
- ***Schiedea spergulina* var. *spergulina*** - a large shrub in the pink family; T
- ***Cyrtandra limahuliensis***, or **ha'iwale** - a shrub in the African violet family (Gesneriaceae); T
- ***Peucedanum sandwicense***, or **makou** - a sprawling herb in the parsley family (Apiaceae); T

On March 4, a package was published listing 21 plant taxa that occur primarily on the island of Hawai'i (the "Big Island"):

- ***Clermontia lindseyana***, or **'oha wai** - a terrestrial or epiphytic shrub in the bellflower family; E
- ***Clermontia peleana***, or **'oha wai** - an epiphytic shrub or tree in the bellflower family; E
- ***Clermontia pyrularia***, or **'oha wai** - a terrestrial tree in the bellflower family; E
- ***Colubrina oppositifolia***, or **kauila** - a tree in the buckthorn family (Rhamnaceae); E
- ***Cyanea copelandii* ssp. *copelandii***, or **haha** - a shrub in the bellflower family with the habit of a woody vine; E
- ***Cyanea hamatiflora* ssp. *carlsonii***, or **haha** - a palm-like tree in the bellflower family; E
- ***Cyanea shipmanii***, or **haha** - a shrub in the bellflower family; E
- ***Cyanea strictophylla***, or **haha** - a shrub or tree in the bellflower family; E
- ***Cyrtandra giffardii***, or **ha'iwale** - a shrubby tree in the African violet family; E
- ***Cyrtandra tintinnabula***, or **ha'iwale** - a shrub in the African violet family; E
- ***Ischaemum byrone***, or **Hilo ischaemum** - a perennial in the grass family (Poaceae); E
- ***Isodendrion pyrifolium***, or **wahine noho kula** - a shrub in the violet family (Violaceae); E

(continued on next page)

Final Listing Rules

(continued from previous page)

- ***Mariscus fauriei*** - a perennial in the sedge family (Cyperaceae); E
- ***Nothocestrum breviflorum*** , or **'aiea** - a stout tree in the nightshade family; E
- ***Ochrosia kilaueaensis***, or **holei** - a tree in the dogbane family; E
- ***Plantago hawaiensis***, or **laukahi kuahiwi** - a perennial herb in the plantain family (Plantaginaceae); E
- ***Portulaca sclerocarpa***, or **po'e** - a perennial herb in the purslane family (Portulacaceae); E
- ***Pritchardia affinis***, or **loulu** - a fan-leaved tree in the palm family (Arecaceae); E
- ***Tetramolopium arenarium*** - a shrub in the aster family; E
- ***Zanthoxylum hawaiiense***, or **a'e** - a tree in the rue family (Rutaceae); E
- ***Silene hawaiiensis*** - a sprawling shrub in the pink family; T

Finally, on March 28, a third rule listed 11 plants found primarily in the Ko'olau Mountains on the island of O'ahu:

- ***Chamaesyce deppeana***, or **'akoko** - a shrub in the spurge family (Euphorbiaceae); E
- ***Cyanea truncata***, or **haha** - a shrub in the bellflower family; E
- ***Cyrtandra crenata***, or **ha'iwale** - a shrub in the African violet family; E
- ***Cyrtandra polyantha***, or **ha'iwale** - a shrub in the African violet family; E
- ***Eugenia koolauensis***, or **nioi** - a shrub or small tree in the myrtle family (Myrtaceae); E
- ***Hesperomannia arborescens*** - a shrubby tree in the aster family; E
- ***Lobelia oahuensis*** - a shrub in the bellflower family; E
- ***Lycopodium nutans***, or **wawae'iole** - an herbaceous epiphyte in the clubmoss family (Lycopodiaceae); E
- ***Melicope lydgatei***, or **alani** - a small shrub in the citrus family; E
- ***Rollandia crispa*** - a shrub in the bellflower family; E
- ***Tetraplasandra gymnocarpa***, or **'ohe'ohe** - a tree in the ginseng family; E

These Hawaiian plant species have declined in numbers and range, and face a variety of threats: habitat destruction by feral or domestic introduced animals; competition from introduced plant species; soil erosion; fire; and predation by non-native goats, rats, and insects. Some of the species listed above now have fewer than 10 surviving individuals.

Four California Plants

A February 4 rule listed four plants native to central coastal California. Three of these are spineflowers, wiry annuals in the buckwheat family (Polygonaceae) that produce a branched inflorescence from a basal rosette:

- **Ben Lomond spineflower** ***(Chorizanthe pungens* var. *hartwegiana)***; E
- **Monterey spineflower** ***(Chorizanthe pungens* var. *pungens)***; T
- **robust spineflower** ***(Chorizanthe robusta)***; E.

The fourth plant is a biennial, or occasionally an annual, plant in the mustard family (Brassicaceae);

- **Ben Lomond wallflower** ***(Erysimum teretifolium)***; E.

All four taxa occur in coastal habitats in southern Santa Cruz and northern Monterey Counties. They are imperiled by residential and golf course development, conversion of habitat to agricultural uses, sand mining, military activities, and/or encroachment by non-native plant species.

Three Caribbean Plants

A February 18 rule listed two Caribbean evergreen trees in the myrtle family:

- ***Myrcia paganii*** - a species known from three sites in the limestone hill area of northwestern Puerto Rico; E
- ***Calyptranthes thomasiana*** - found on three islands: Vieques, a small islet off Puerto Rico; St. John in the U.S. Virgin Islands; and Virgin Gorda in the British Virgin Islands; E.

Another Puerto Rican plant, a member of the buckthorn family, was listed March 2:

- ***Auerodendron pauciflorum*** - an evergreen shrub or small tree from the island's northwestern limestone hills; E.

All three species are threatened by agricultural and tourist development.

Holy Ghost Ipomopsis *(Ipomopsis sancti-spiritus)*

This plant, a biennial to short-lived perennial in the phlox family (Polemoniaceae), is known only from a single site in the Sangre de Cristo Mountains of San Miguel County, New Mexico. Its small numbers, restricted range, and proximity to human development make the species vulnerable to road construction or maintenance and pesticide or herbicide use. A March 23 rule listed the Holy Ghost ipomopsis as Endangered.

Tidewater Goby *(Eucyclogobius newberryi)*

A relatively small fish, the tidewater goby is endemic to the freshest of brackish water habitats in coastal lagoons along the California coast from Del Norte County south to San Diego County. Within this range, coastal development has eliminated the goby from nearly 50 percent of the coastal lagoons it once inhabited. Continuing threats led the Fish and Wildlife Service to list this species on February 4 as Endangered.

Hungerford's Crawling Water Beetle *(Brychius hungerfordi)*

This small, rare beetle is found in low numbers within two Michigan streams and a river in Ontario, Canada. It inhabits cool riffles of clean, slightly alkaline waters. Management of the streams and adjacent habitats that may alter these aquatic conditions threatens the survival of the water beetle. The species was listed March 7 as Endangered.

Regional News

(continued from page 2)

marshland erosion along the Gulf Intracoastal Waterway, prescribed burning of uplands to promote their use by cranes, and the creation of coastal marsh using dredge spoil material. Shoreline armoring involves using concrete mats to protect the shore from boat-wakes and wave erosion, which have caused the loss of between 3 and 4 acres of marshland habitat annually.

Bill Lishman reported on his research on training Canada geese *(Branta canadensis)* to follow a preselected migration route and use a specific wintering site. The Team endorsed Mr. Lishman's research proposal to train sandhill cranes *(Grus canadensis)* to follow a similar migration route, and the National Biological Survey staff from Patuxent Wildlife Research Center has agreed to provide sandhill crane eggs for the study in 1994. If results of the sandhill crane research are favorable, the technique will be tested on Endangered whooping cranes (*Grus americana*) to see whether it might be used to reintroduce captive-reared whoopers in a migratory situation.

*****

The annual meeting of the Whooping Crane Conservation Association (WCCA) followed the U.S. Whooping Crane Recovery Team meeting on February 25.

Lynn Starnes (the FWS Deputy Regional Director), Dr. Jim Lewis (Recovery Team Leader), and four Recovery Team members spoke at the meeting.

The WCCA and World Wildlife Fund-Canada (Fund) announced favorable reviews of grant applications for assistance in continuing the guidebird experiments for the Rocky Mountain population of whooping cranes in 1994. The WCCA will provide $5,000 and the Fund $15,000 (Canadian) for the project, which they supported at similar levels in 1993.

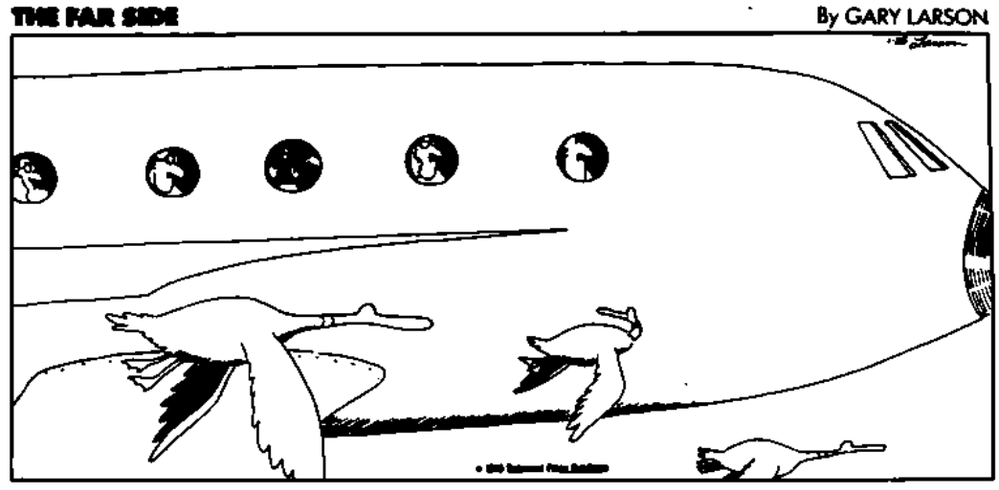

photo by Lishman/Duff

In flight: Shown during their fall 1993 migration, these captive-raised Canada geese followed Bill Lishman in his ultra-light aircraft from Ontario to Virginia. In early April 1994, the "ultrageese" took the initiative and made the 400-mile journey home without their mechanical leader.
Today, Canada geese; tomorrow, sandhill cranes?

*****

Region 3 - The 1993 survey for the Illinois cave amphipod (*Gammarus acherondytes*) resulted in bad news for this category 1 listing candidate: not a single specimen was found. This small crustacean is known from only 6 caves in Illinois. The entrance to one cave was bulldozed by the landowner and could not be searched.

*****

In Michigan, State and Federal biologists are intensifying their research, management, and outreach efforts on behalf of the Endangered Great Lakes population of the piping plover (*Charadrius melodus*), now at a perilously low level. Since 1983, the number of Great Lakes pairs nesting in the State has ranged from 12 to 19.

This year, the Michigan Department of Natural Resources will be contacting private landowners in plover habitat to provide educational material. The FWS East Lansing, Michigan, Field Office also will develop an updated brochure and interpretive signs for use at public access sites in prime plover habitat. Biologists will expand protection efforts to include locating, caging, and monitoring every nest. In addition, a lab under contract to the Patuxent Analytical Control Facility is

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Regional News

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analyzing 26 addled plover eggs. Previous analyses indicated that high levels of environmental contaminants, such as PCB's, mercury, and selenium, may be causing embryo death, thus hindering recovery of the species.

*****

The recovery team for the Endangered Karner blue butterfly (*Lycaeides melissa samuelis*) met for the first time on February 23 and 24, uniting representatives from public and private organizations to begin drafting a recovery plan. Most widespread in Wisconsin, the butterfly can be found in portions of Indiana, Michigan, Minnesota, New Hampshire, and New York, and may also be present in Illinois.

Along with FWS personnel, team members include faculty from three universities (and one student), State natural resources department biologists, and The Nature Conservancy staff. FWS field offices represented are Green Bay, Wisconsin; Bloomington, Indiana; Cortland, New York; and the Necedah National Wildlife Refuge. The team expects to complete the first draft of a recovery plan by the end of the year and a final plan by June 1995.

*****

Region 4 - The FWS and The Nature Conservancy are developing a Partners for Wildlife cooperative agreement to eliminate pollution in the Clinch River. A Tennessee River tributary in eastern Tennessee, the Clinch River contains a diversity of freshwater fish and mussels that are being affected by poor land use practices. The primary source of pollution is silt caused by the removal of riparian habitat and by cattle that crush stream banks and wander into streams. Under the cooperative agreement, the FWS will be able to help fund The Nature Conservancy's attempts to assist local landowners in minimizing or eliminating siltation.

*****

By contacting 200 organizations about 70 insect species that are candidates for listing, the FWS Asheville, North Carolina, Field Office gathered information about the status, location, and threats affecting each species. All the insects occur within Kentucky, North Carolina, South Carolina, and/or Tennessee; some occur in other States as well.

FWS biologists collected enough information to warrant proposed category changes for some species. In fact, FWS staff members found this *en masse* approach to surveying so effective and economical that they plan to use it for crustaceans and other "low visibility" taxonomic groups.

*****

Region 5 - West Virginia Department of Natural Resources (WVDNR) biologists conducting winter bat surveys counted 113 Indiana bats (*Myotis sodalis*), including a new population in a cave in Pocahontas County. Other bats hibernating at the site were 2,382 eastern pipistrelles *(Pipistrellus subflavus)*, 738 little brown bats *(Myotis lucifugus)*, 1 small-footed bat *(Myotis leibii)*, and 15 big brown bats *(Eptagicus fiscus)*.

photo by Al Hicks, New York Department of Environmental Conservation

Indiana bat

Of note this winter was an increase in the number of *M. sodalis* hibernating in Martha's Cave, also in Pocahontas County. In the 1950's, as many as 180 *M. sodalis* were seen in Martha's Cave, but the number had dropped to 23 by 1980. After the cave entrance was fenced to control disturbance, the number began to increase. By 1992, the 210 total exceeded the historic level. The winter 1993-94 survey found 241 bats.

*****

Also in West Virginia, nest box inspections resulted in the discovery of

(continued on page 22)

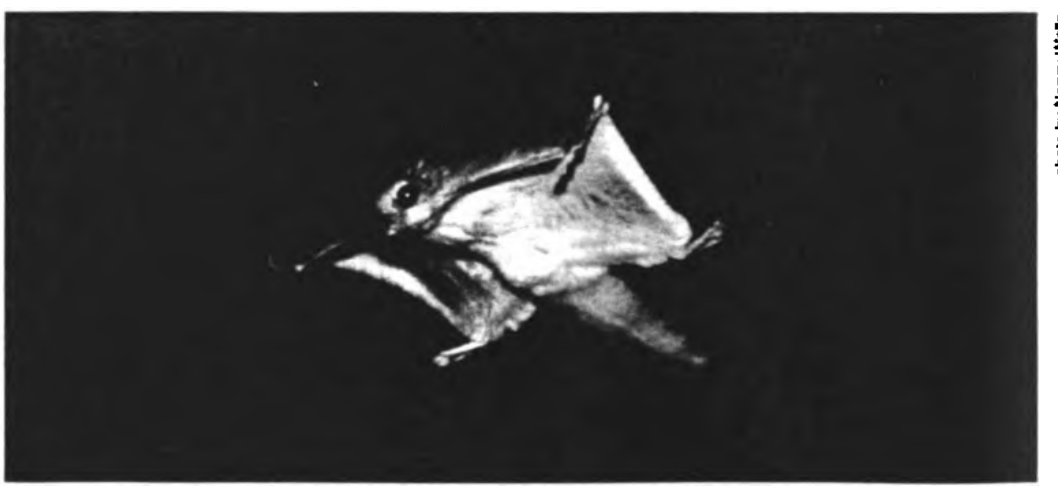


photo by Nancy Wells

Virginia northern flying squirrel in flight

Regional News

(continued from page 21)

new localities for the Endangered northern flying squirrel *(Glaucomys sabrinus fuscus)*. Monongahela National Forest biologists captured three squirrels at new sites in Pocahontas County — one near Clubhouse Run and two at Mountain Lick Creek. Dr. Edwin Michael of West Virginia University captured a single northern flying squirrel in Canaan Valley, Tucker County. A WVDNR biologist discovered an additional site when he found a dead flying squirrel impaled on a barbed wire fence near White's Cemetery in Randolph County.

*****

What biologists thought was a defeat in their attempts to reestablish the Delmarva Peninsula for squirrel *(Sciurus niger cinereus)* in Virginia may turn out to be a victory. A single fox squirrel, spotted after 100 hours of intensive "feeder-watch" program, confirmed that the Endangered animals have successfully reproduced at a second release site on Virginia's Eastern Shore. Before abandoning recovery efforts at the site, team members from the Nature Conservancy and Virginia Department of Game and Inland Fisheries conducted what they suspected might be a final vigil to determine if any of the two dozen Delmarva Peninsula fox squirrels released during the early 1980's had survived.

Biologists will continue their efforts to document the existence of fox squirrels at this location, and may introduce more of the animals to increase genetic diversity. Before attempting to establish a second population, the FWS succeeded in reintroducing the species at Chincoteague National Wildlife Refuge.

*****

A new database agreement among public and private agencies in New Jersey will help endangered species conservation in the State. The FWS New Jersey Field Office and Delaware Bay Estuary Project, The Nature Conservancy, and the New Jersey Natural Heritage Program have agreed to allow FWS offices to become "nodes on the network" of the Biological Conservation Database. This database contains the most comprehensive compilation of candidate and federally-listed species information available in New Jersey. Installing the database into Service offices will provide a shared reference that should help unify efforts to protect rare, Threatened, and Endangered species in the State.

photo by Gus VanVliet

The Fish and Wildlife Service is working to develop population estimates in southeast Alaska for seabirds such as this marbled murrelet, along with other category 2 listing candidates. The light coloring is typical of young birds.

*****

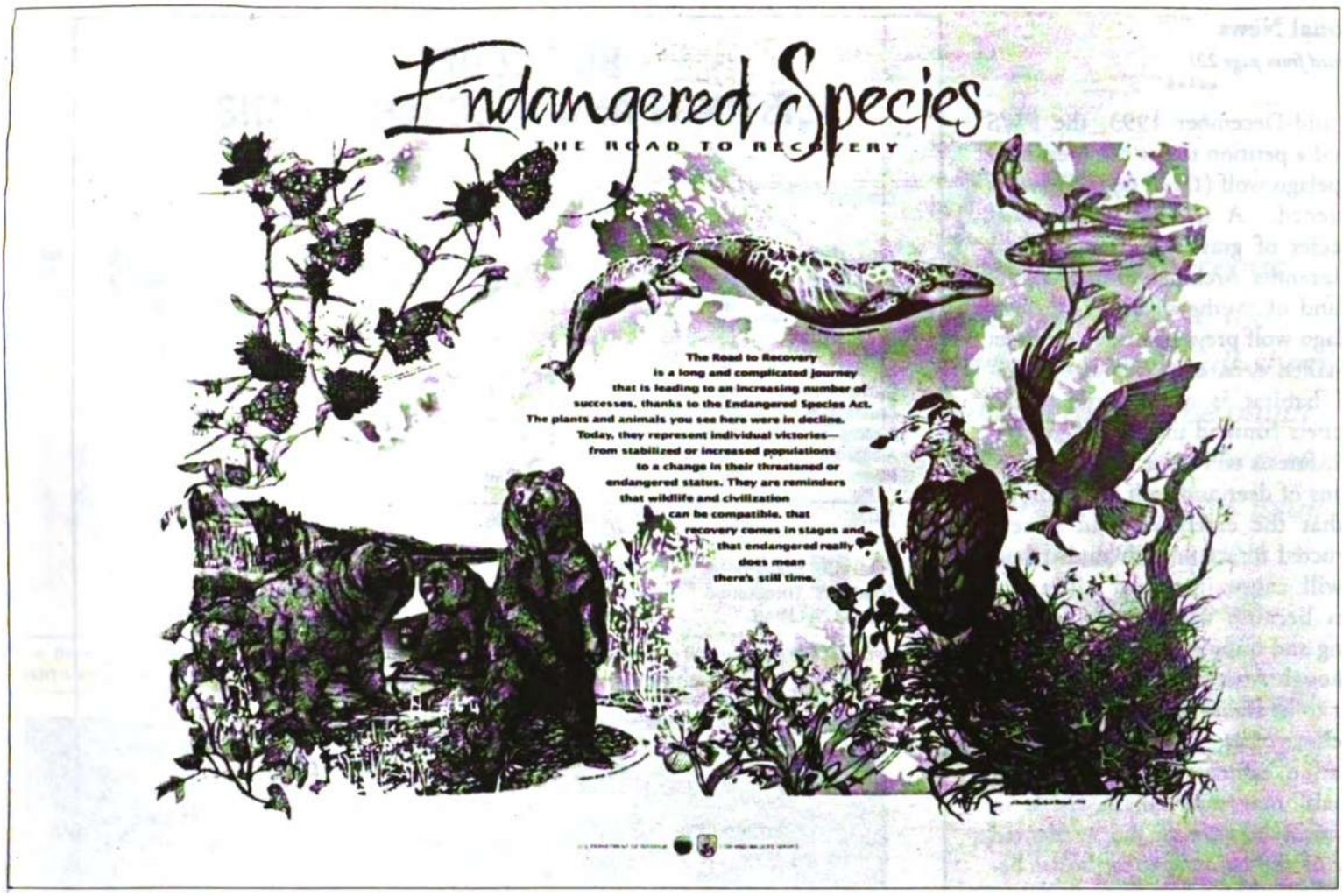
Region 7 - Continuing amphibian field studies initiated in 1991, FWS Juneau Field Office biologists surveyed four southeast Alaska rivers during 1993 for spotted frogs (*Rana pretiosa*), a Category 2 listing candidate in the State. Investigations included a mark-recapture study to estimate abundance at one area on the Stikine River where spotted frogs had previously been observed. During 1991 and 1992, the species was documented along this river and on several islands near its delta. Preliminary analysis indicates that about 800 spotted frogs occupy 7 small ponds within an approximate 1-hectare (2.5-acre) study area.

Biologists also surveyed the Chickamin, Unuk, and Taku Rivers to determine the presence of spotted frogs and other amphibians. The 1993 survey is the first documentation of unconfirmed reports on the Taku River, where the frogs were seen at several locations.

*****

Region 7 has increased efforts to develop a population estimate for two Category 2 listing candidates — marbled murrelets (*Brachyramphus marmoratus*) and Kittlitz's murrelets (*Brachyramphus brevirostris*) — along with other seabirds in southeast Alaska. Little information is available on which to base current status analysis for most seabirds in this area.

During 1993, Juneau Field Office biologists initiated surveys for murrelets and other species in Sumner Strait, Icy Strait, and Glacier Bay. Biologists will expand survey efforts in 1994 and subsequent years to establish baseline information and monitor population trends. *(continued on page 24)*



The Road to Recovery, a new full-color poster illustrated by artist Dorothy Michele Novick, depicts some of the progress being made in the effort to restore our nation's vunerable wildlife. It features six threatened and endangered animals and plants—from the bald eagle to the western prarie fringed orchid—that are now stable or even improving in status. The 26-by-39-inch poster is available for $6.50 by writing the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, or by calling 202/783-3238. Ask for product number 024-010-00702-8.

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You can now send us your articles through Internet. The Fish and Wildlife Service (Service) has access to the Internet electronic mail service via the Service's Wide Area Network. With this service, we can send and receive messages from Internet users worldwide.

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We look forward to hearing from you!

Bulletin Staff

Regional News

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*****

In mid-December 1993, the FWS received a petition to list the Alexander Archipelago wolf (*Canis lupus ligoni*) as Threatened. A smaller, dark-colored subspecies of gray wolf that inhabits the Alexander Archipelago and coastal mainland of southeast Alaska, the Archipelago wolf preys primarily on Sitka black-tailed deer, a species whose preferred habitat is old growth forest. Petitioners contend that logging of old growth forests will cause significant reductions of deer and wolf populations, and that the extensive road system constructed to accomplish timber harvest will cause increased killing of wolves because of legal and illegal hunting and trapping.

Although Archipelago wolf numbers appear to be stable at present, petitioners believe that the relatively small population, estimated at 700-1,000 individuals, may not remain viable in many areas because of the segmented nature of the landscape, territorial behavior of the animal, and other behavioral traits. A decision on the petition is expected soon.

BOX SCORE
LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S.	ENDANGERED Foreign Only	THREATENED U.S.	THREATENED Foreign Only	LISTED SPECIES TOTAL	SPECIES WITH PLANS
Mammals	56	251	9	22	338	37
Birds	73	153	17	0	243	73
Reptiles	16	83	19	14	112	30
Amphibians	6	8	5	0	19	9
Fishes	63	11	38	0	112	63
Snails	14	1	7	0	22	27
Clams	50	2	6	0	58	40
Crustaceans	11	0	2	0	13	4
Insects	19	4	9	0	32	16
Arachnids	4	0	0	0	4	0
Plants	375	1	83	2	471	184
TOTAL	697	494	195	38	1,424*	483**

Total U.S. Endangered	697	(312 animals, 385 plants)
Total U.S. Threatened	195	(112 animals, 83 plants)
Total U.S. Listed	892	(424 animals, 468 plants)

* Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, chimpanzee, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

** There are 377 approved recovery plans. Some recovery plans cover more than one species, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of CITES Party Nations: 122

June 3, 1994

May/June 1994 Vol. XIX No. 3

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

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July/August 1994 Vol. XIX No. 4

ENDANGERED SPECIES

Technical Bulletin

U.S. Department of the Interior
Fish and Wildlife Service

Restoration of the Bald Eagle and Gray Whale Marks Progress in Recovery

America's efforts to save rare species reached several important milestones recently. On June 30, the Fish and Wildlife Service (FWS) announced that most bald eagle *(Haliaeetus leucocephalus)* populations have recovered sufficiently to allow a proposed upgrading of its status from "Endangered" to the less critical category of "Threatened" in most of the Nation. This good news follows a June 15 publication in the *Federal Register* formally recognizing the recovery of the California gray whale *(Eschrichitius robustus)* and removing it from the List of Threatened and Endangered Species.

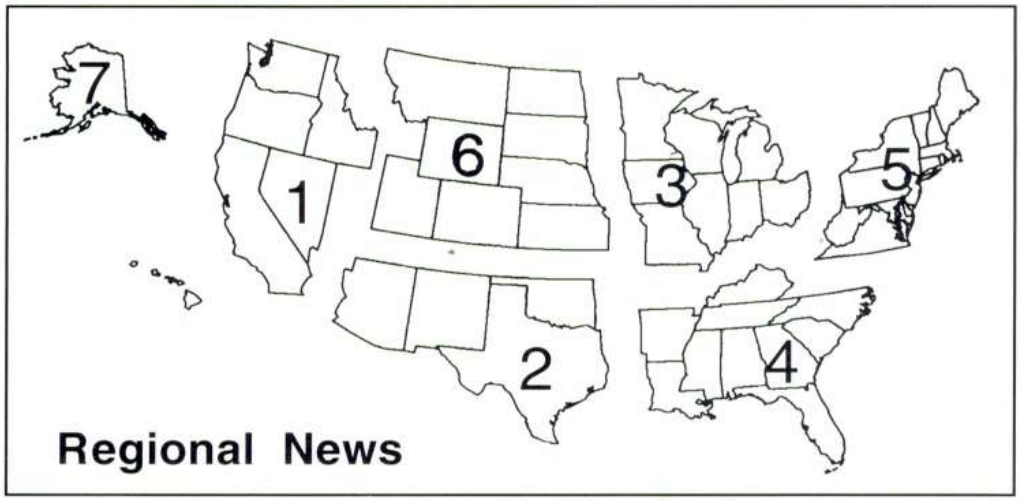
Giving Wing to Hope

In ceremonies at Blackwater National Wildlife Refuge in Maryland, FWS Director Mollie Beattie celebrated the bald eagle's improvement by releasing to the wild a 10-pound adult female nicknamed "Hope." The eagle had been rehabilitated at the Bal-

(continued on page 5)

Washington Post photo by James Thresher

Fish and Wildlife Service Director Mollie Beattie releases "Hope," a rehabilitated bald eagle, symbolizing the comeback of our national symbol. "The eagle's recovery is a tribute to the success of the Endangered Species Act and other conservation laws, and to the selfless efforts of the many, many people who have worked so hard to bring the eagle back from the brink of extinction," Beattie said.



Regional News

Regional endangered species contacts have reported the following news:

Region 2 - Fish and Wildlife Service (FWS) biologists braved unseasonably cold weather this spring to seine the Comal River near New Braunfels, Texas, in an effort to collect fish and invertebrate samples for a study of the Comal River system. Now in its third year and scheduled to continue for at least 2 more years, the study will result in the most in-depth biological information yet compiled about this unique river system.

*****

In response to the March 14 "not warranted" finding issued by the FWS on a petition to remove seven cave-dwelling invertebrate species from the Endangered Species List, Williamson County Commissioners filed a lawsuit against the FWS in the U.S. District Court in Austin, Texas. The suit contends that two of the invertebrates, the Tooth Cave ground beetle (*Rhadine persephone)* and Bone Cave harvestman (*Texella reyesi),* are found at many sites in both Travis County and Williamson County and therefore do not warrant listing as Endangered.

The FWS based its decision not to delist the species on continuing threats to the invertebrates and the caves they inhabit, including: predation by, and competition with, non-native fire ants; habitat destruction and deterioration resulting from activities such as cave-filling and trash-dumping; an increase in impermeable ground-cover; potential contamination from septic effluents, sewer leaks, run-off, and pesticides; and cave vandalism.

Other invertebrate species listed in the petition are the Coffin Cave mold beetle (*Batrisodes texanus*), Tooth Cave spider (*Leptoneta myopica*), Tooth Cave pseudoscorpion (*Microcreagris texana*), Kretschmarr Cave mold beetle (*Texamaurops reddelii*), and Bee Creek Cave harvestman (*Texella reddelii*). As of mid-July, there was no specific date for Federal Court action on the lawsuit.

*****

The FWS Texas Ecological Services Office has assembled eight educational resource trunks stocked with videotapes, slide shows, books, brochures, and flashcards. Four of the eight trunks are devoted to fish and wildlife

(continued on page 22)

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Administrative Changes Will Make Endangered Species Act More "User-friendly" and Improve Benefits to Species

A series of new policies aimed at improving the Endangered Species Act's effectiveness in recovering listed species, while making it easier for people to work with and understand, were announced June 14 by Interior Secretary Bruce Babbitt and D. James Baker, Under Secretary of Commerce for Oceans and Atmosphere.

Among the changes are policies that minimize the social and economic impact of recovery planning under the Act; provide independent scientific peer review of listing and recovery decisions; require agencies implementing the Act to identify quickly and clearly activities on private lands that may be affected by a listing decision; create cooperative, ecosystem-based approaches to conserve listed and candidate species before crises arise; establish guidelines to ensure that decisions made under the Act represent the best available scientific information; and provide a greater role for State agencies, along with a closer working relationship between Federal and State officials.

In addition, President Clinton has asked the Interior and Commerce departments to convene an interagency working group to recommend additional ways to improve administration of the Act.

"These reforms are a solid step in the right direction," said Senator Max Baucus (D-Montana), Chairman of the Senate Environment and Public Works Committee. "If implemented properly, this reform package should produce better conservation decisions that cost society less and win more public support."

"Critics of the Endangered Species Act have often said that listing decisions must be based on sound science," said Representative Gerry E. Studds (D-Massachusetts), Chairman of the House Merchant Marine and Fisheries Committee. "With today's announcement, the Administration is moving aggressively toward that goal."

To ensure that the scientific analysis of information used to list and recover species is as comprehensive as possible, a new policy establishes an independent peer review process. The government will solicit expert opinion of three independent specialists to analyze data on which listings are based. The peer review process will also be used during development of recovery plans. In addition, guidelines have been established to guarantee that the information used to implement the Act represents the best data available.

Under another new policy, designed to minimize social and economic effects from recovery planning, the composition of recovery planning teams will be expanded beyond the scientific community to include other areas of expertise. Public input during recovery planning has always been solicited, but including representatives of local interests on recovery teams will ensure that recovery decisions are both scientifically sound *and* sensitive to human needs. The goal is to reduce the likelihood of economic disruption caused by recovery activities, while ensuring species recovery.

Another policy, designed to ease concern about private land uses when one or more listed species is present, requires the government to identify immediately those actions permissible under the Act and those that could be violations. The information would be provided in the final listing rule, along with a Service contact for landowners uncertain about activities not delineated in the rule. This policy will apply to all plants and animals listed after October 1, 1994.

A statement from one of the Nation's largest private timberland owners was presented at the announcement. "We applaud the leadership of Secretary Babbitt and Under Secretary Baker," said John F. Rasor, Vice-President of the Georgia Pacific Corporation. "Georgia Pacific stands ready to provide leadership to the much-needed dialogue to make the Endangered Species Act work faster and better."

In an effort to improve coordination, the Fish and Wildlife Service and the National Marine Fisheries Service will work closely with other Federal agencies, the States, Tribal governments, and private groups to conserve listing candidates before listing is needed. Both agencies will consult States on candidate species identification and conservation; listing decisions; and recovery activities, including development of recovery plans.

The government will also emphasize multi-species listings and recovery plans for species sharing the same ecosystem. "Communities, businesses, and landowners need to plan their futures with reasonable confidence, and that is why we are shifting the focus away from individual species and toward the concept of ecosystems," Secretary Babbitt said. "By looking at the big picture, by focusing our resources and efforts on ecosystems rather than individual species, we can get away from crisis management where our choices are limited and our costs are high," added Mollie Beattie, Director of the Fish and Wildlife Service.

The interagency working group established to review the Endangered Species Act and suggest further improvements will seek the participation of all other Federal agencies to identify additional administrative changes. Input from the States, county and local governments, and private citizens will also be sought.

Except as noted above, these new policies became effective upon their publication in the July 1, 1994, *Federal Register*.

Senate Subcommittee Hears Testimony on Administration of the Endangered Species Act

by Denny Lassuy

The improvements in administration of the Endangered Species Act announced by Interior Secretary Babbitt and Commerce Under Secretary Baker on June 14 were presented to Congress the next day in a hearing before the Senate Environment Subcommittee on Clean Water, Fish and Wildlife. This was the first in a series of hearings planned by the Senate Environment Committee on reauthorization of the Endangered Species Act.

Chairman Graham of Florida opened the hearing by applauding the new policies, particularly noting his support for ecosystem-based approaches. He also said while he recognizes species loss is a natural event, he believes the rate of loss has been sharply accelerated by human activity.

Senator Baucus of Montana referred to the Act as "critically important" but cited the "mixed reviews" it has received of late. He pointed out that controversy is the exception rather than the rule under the Act and went on to explain aspects of S. 921, a reauthorization bill he and Senator Chafee have introduced that has been endorsed by the Western Governor's Association.

Senator Chafee of Rhode Island, the subcommittee's ranking Republican, called the Act "a terrific law," referred to its historically strong support in the Senate, and stressed the need to protect the ecosystems upon which Threatened and Endangered species depend.

Senator Kempthorne of Idaho noted that his State has an economy based on resource use and that most of those resources are found on Federal lands. He suggested that implementation of the Act has been based on "inaccurate science" and resulted in "incessant planning."

In his testimony, Secretary Babbitt said the Act is a strong, yet flexible law, and he cited the new policy directives announced the previous day. He briefly explained the new directives and said that he operated on three principles: 1) use comprehensive, unimpeachable science, 2) get involved early, and 3) maintain an ecosystem focus. He noted four specific cases (Pacific Northwest Forest Plan, habitat conservation planning in California, Platte River water use, and working with Georgia-Pacific on red-cockaded woodpeckers) that he had learned from, and which formed much of the basis for the new directives.

Assistant Commerce Secretary Hall said that "Commerce shares the principles cited by Secretary Babbitt," and that the challenge is to reduce the need for species listings by properly implementing other Federal conservation laws. Commerce, through the National Marine Fisheries Service, has jurisdiction under the Act for most marine species.

Senator Chafee referred to the Secretary's accounting of over 118,000 interagency consultations carried out under Section 7 of the Act, with only 33 halting projects, as "an astounding and reassuring statistic." Secretary Babbitt said this clearly shows that the process works, and he suggested that many Federal actions may well have been improved to the mutual benefit of both the project and the species through Section 7.

Dr. E.O. Wilson, the noted authority on biodiversity from Harvard University, also testified at the hearing. He said that all nations have three sources of wealth — material, cultural, and biological — and that the latter was "pathetically unknown." A typical pinch of forest soil, he noted, may contain thousands of species, most of them unknown. This, Dr. Wilson said, is the "vast nexus of life that is protected when we save an ecosystem." He added that America's aquatic ecosystems are its most endangered, and closed by asking people to "look to the human mind" and realize the psychological and spiritual value of our biological heritage.

Testimony was also presented by Michael Bean of the Environmental Defense Fund. He recounted the decline and recovery of the whooping crane, and said its example illustrated three lessons: 1) although steady progress is possible, there is no instant recovery for species on the edge; 2) getting involved in species recovery late is more risky and costly; and 3) while some people use species like the crane to "whoop up controversy and excite fear," there have been very few conflicts under the Act.

Former Senator McClure, speaking for the National Endangered Species Act Reform Coalition, said his organization is not seeking to repeal but to reform the Act by making it "more useful, more economical, and more democratic." He also said he disagreed with a Supreme Court decision that the Act has primacy over other Federal laws, and suggested that Congress had not intended the Act to have such power.

During his questioning of the witnesses, Senator Baucus cited an Environmental Protection Agency risk assessment study that pointed to species loss and ecosystem disruption as greater long-term risks to human activity than particular pollutant risks, and he asked Mr. McClure for his opinion. Mr. McClure suggested "science is ambiguous" and risk assessment "needs work."

Senator Chafee asked Mr. Bean if the fact that no Constitutional takings

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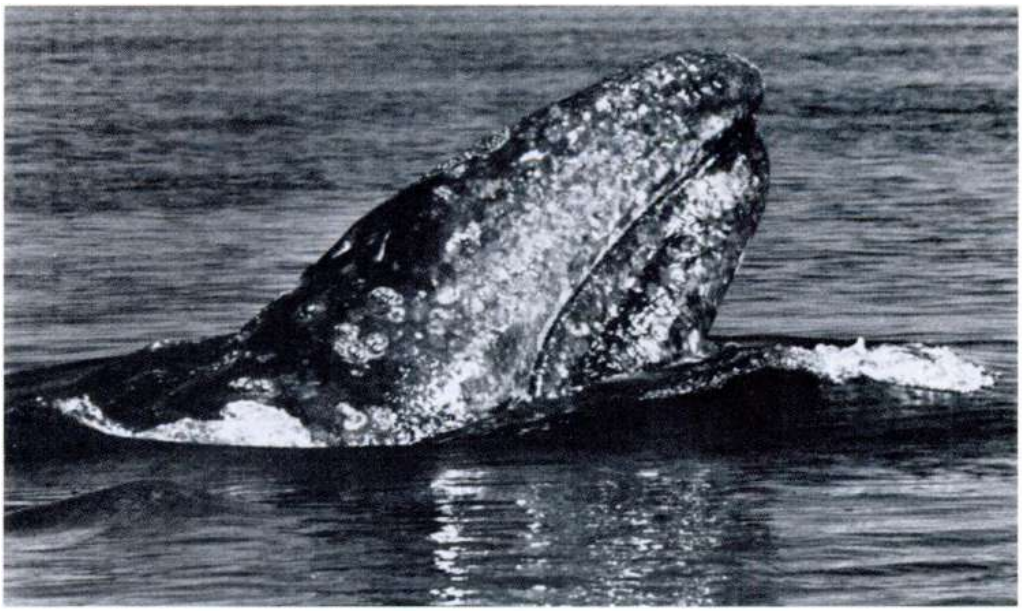

photo by D.W. Rice

California gray whale

Recovery Progress

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timore Zoo and Tri-State Bird Rescue and Research in Newark, Delaware, after suffering a broken wing.

"With the release of this bird, we rejoice in the recovery of not just this eagle, but the recovery of bald eagle populations in most of the Nation," Beattie said. "The recovery of this species is a great success story. This Independence Day we will have additional reason to celebrate with the return of the bird that symbolizes our country's freedom and fierce pride."

Hope's release accompanied an announcement that the FWS would propose to reclassify the Nation's symbol from "Endangered" to Threatened" throughout its listed range (the conterminous 48 States), except in the Southwest. Bald eagle numbers in the lower 48 States have climbed from about 417 nesting pairs in 1963 to more than 4,000 pairs of adult birds in 1993. In addition, biologists estimate there are 5,000 to 6,000 juvenile bald eagles in this part of North America. Under the proposed rule, the "Threatened" classification will be retained until full recovery is achieved.

Currently, eagles are listed as Endangered in 43 States and as Threatened in Minnesota, Michigan, Oregon, Washington, and Wisconsin. The FWS proposal would reclassify the eagle to "Threatened" throughout the lower 48, except in Arizona, New Mexico, western Texas, and a small portion of southeastern California, where the species' recovery has been slower. The bald eagle would remain listed as Endangered in this area until the population is more secure. Under the Endangered Species Act, an "Endangered" species is one that is likely to become extinct, while a "Threatened" species is one likely to become Endangered. Eagle populations in Alaska and Canada are considered healthy, and are not listed as Endangered or Threatened.

A Threatened designation more accurately reflects the species' improving status, but does not remove the protection afforded the bald eagle under the Endangered Species Act. The eagle is also protected under the Eagle Protection Act and the Migratory Bird Treaty Act, as well as under various State laws. Its protection under these statutes would not be affected by the reclassification proposal.

Historically, bald eagles nested throughout most of North America, but habitat loss, uncontrolled shooting, and poisoning by the pesticide DDT reduced the species' population to the point that it was listed as Endangered in 1967. Recovery activities carried out since that time have included protecting nesting sites, including other important habitat in the National Wildlife Refuge System, and reintroducing eagles into unoccupied habitat. Many States have reestablished nesting populations by translocating young eagles from areas where populations are healthy, raising them, and releasing them to the wild. When mature, these eagles often return to the area to nest. These ongoing

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Senate Hearing

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of private property under the Act have ever been determined by any court indicated that court action was simply out of the reach of small landowners. Mr. Bean said he imagined some are without the means to go to court, but he added that no claim of such taking had even been filed by any citizen, including large landowners.

Senator Kempthorne asked if the term "ecosystem management" was even in the Act. Mr. Bean indicated that it is not, but that the protection of ecosystems is among the statements of purpose of the Act. The Senator closed by lauding the beauty of his home State of Idaho, to which Dr. Wilson volunteered "and may you lose not a single species." On that note, Chairman Graham adjourned the hearing.

Other subcommittee hearings this summer and fall are to focus on endangered species conservation on private property, implementation of the Act by Federal land management agencies, recovery planning, and preventing endangerment. Reauthorization of the Act is not expected until next year.

Denny Lassuy is a Legislative Specialist with the FWS Office of Legislative Services.

Report Chronicles Progress in Endangered Species Recovery

by Jennifer Heck

Nearly 40 percent of all species listed federally as Threatened or Endangered are now stable or improving, according to a report recently released by the U.S. Fish and Wildlife Service (FWS). *Endangered and Threatened Species Recovery Program - Report to Congress*, the second such report prepared in compliance with the 1988 amendments to the Endangered Species Act, provides information on population status and recovery plan development for the 711 species listed in the United States as of September 30, 1992, that are under FWS jurisdiction.[1]

As a result of recovery efforts, 10 percent of the 711 species are reported as improving and an additional 28 percent are considered stable. The number of species considered to be in decline is 33 percent. The percentage of species whose status is unknown is 27 percent, and the remaining 2 percent of the 711 listed species are believed to have gone extinct prior to listing.

It is FWS policy to prepare a recovery outline within 60 days of listing a species, a draft plan within 1 year of listing, and a final recovery plan within 2.5 years of the date of listing. Recovery plans also are reviewed and revised every 5 years or more often if necessary. Because recovery efforts are carried out under a fixed budget, the FWS employs a priority system when allocating funds for species recovery. Under this system, each species is assigned a priority rank based on its degree of threat, recovery potential, taxonomy, and degree of conflict with development activities.

According to the 1992 Recovery Report, 58 percent of the 711 species had final recovery plans and an additional

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[1] Federal species listings through September 1992 totaled 728 but 17 of these are under primary jurisdiction of the National Marine Fisheries Service of the Department of Commerce.

More than half of the species listed as Endangered or Threatened are plants. In recent years, cooperative management efforts involving Federal, State, local, and private partners have resulted in notable progress in plant recovery. Between September 1992 and June 1994, three plant species have been delisted and one has been reclassified from Endangered to Threatened. Delisted plant species include the Tumamoc globeberry *(Tumamoca macdougalii)*, spineless hedgehog cactus *(Echinocereus triglochidiatus inermis)*, and McKittrick pennyroyal *(Hedeoma apiculatum)*. The Siler pincushion cactus *(Pediocactus sileri)*, reclassified to Threatened in 1993, is one of several cactus species showing improvement in the southwestern United States. Four additional plant species have been proposed for reclassification — the Loch Lomond coyote thistle *(Eryngium constancei)*, small whorled pogonia *(Isotria medeoloides)*, Virginia round-leaf birch *(Betula uber)*, and MacFarlane's four-o'clock *(Mirabilis macfarlanei)*.

photo by Peggy Olwell

Cooperative recovery efforts involving the Bureau of Land Management, Fish and Wildlife Service, New Mexico Department of Game and Fish, and The Nature Conservancy have improved the status of the Knowlton cactus* (Pediocactus knowltonii), *a small species with a very restricted range.

The FWS faced a challenge in the case of the Peter's Mountain mallow *(Iliamna corei)*, a plant that occurs naturally at only one known site in southwest Virginia. Only three individuals of this species remained when it was listed in 1986, and they were not producing seeds. Botanists from Virginia Tech University recovered viable seeds from leaf litter at the site and succeeded in producing many healthy plants and thousands of seeds, allowing for additional research on the germination process of this species. It was determined by botanists at the University of Kentucky that, under natural conditions, the seed coats were broken by the heat from fires. Fire suppression had therefore contributed to the decline of this species. Its site is now owned and protected by The Nature Conservancy. Prescribed burning is being used successfully by the Virginia Department of Conservation and Recreation, in cooperation with the U.S. Fish and Wildlife Service, U.S. Forest Service, and Virginia Department of Agriculture and Consumer Services, to further promote the species' recovery.

Report Chronicles Recovery

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8 percent had draft plans as of September 30, 1992. Most of the remaining species without recovery plans had been listed for less than 3 years and recovery plans for these species were under development. By September 1996, the FWS plans to eliminate the backlog of species listed longer than 2.5 years that lack recovery plans. Recognizing that several listed species may share geographic locations and/or face common threats, the FWS will continue to seek opportunities to combine several listed, proposed, and/or candidate species in one recovery plan. This approach, known as the "multi-species" or "ecosystem" approach, can improve the rate, fiscal efficiency, and effectiveness of recovery planning.

The Recovery Report documents recovery achievements in each of the 50 States. These achievements extend across taxonomic lines to include plants, mammals, birds, fish, insects and other invertebrates, reptiles, and amphibians. The Aleutian Canada goose (*Branta canadensis leucopareia*) was reclassified from Endangered to the less critical category of Threatened in 1990. The FWS is considering upgrading the classification of several other species, including the American peregrine falcon (*Falco peregrinus anatum*), Columbian white-tailed deer (*Odocoileus virginianus leucurus*), and the bald eagle (*Haliaeetus leucocephalus*). The Threatened greenback cutthroat trout (*Oncorhynchus clarki stomias*), first listed as Endangered in 1967, is nearing its recovery goals and could be delisted by the year 2000.

Other species, though not under formal consideration for reclassification or delisting, have improved notably since publication of the first Recovery Report in 1990. As detailed in the 1992 Recovery Report, the grizzly bear (*Ursus arctos horribilis*), red wolf (*Canis rufus*), black-footed ferret (*Mustela nigripes*), least Bell's vireo (*Vireo bellii*

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photo by Chris Lucash

After a close brush with extinction in the early 1970's, the red wolf is well on the way toward recovery.

The following information was provided by Gary Henry, FWS Red Wolf Recovery Coordinator in Asheville, North Carolina.

The red wolf is one of the most significant success stories of the endangered species recovery program. When the Endangered Species Act became law in 1973, the red wolf was on the verge of extinction, with an estimated population of 100 animals or fewer. These wolves were being genetically swamped by interbreeding with the coyote *(Canis latrans)* in their last habitat in southwestern Louisiana and southeastern Texas. To prevent extinction of the last few red wolves, a decision was made to remove them from the wild, place them in captivity for breeding purposes, and later reintroduce them to historic habitats. After capturing as many as possible and screening them for genetic purity, a founder population of 14 red wolves began the long process of recovery.

Recovery goals were established at 550 animals, with 330 in captivity in at least 30 breeding facilities and 220 animals in the wild in at least 3 populations. At the close of 1993, the red wolf population had recovered to 233-247 animals, with 187 in 31 captive breeding facilities and 2 island propagation projects, and 46-60 in the wild in 2 populations. The Red Wolf Recovery Program is now more than halfway to its captive breeding goal and over one-fourth of the way to its wild population goal.

In addition, the methodology and techniques used in this recovery effort have been adopted by recovery programs for a variety of species including the California condor *(Gymnogyps californianus)*, black-footed ferret, Mexican wolf *(Canis lupus baileyi)*, and Rocky Mountain wolf *(Canis lupus irremotus)*.

Recovery Progress

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programs (many of them funded through Section 6 of the Endangered Species Act), coupled with the 1972 ban on DDT, have helped boost eagle numbers in much of the species' range. Vigorous law enforcement and public awareness campaigns to reduce illegal shooting of eagles also have contributed. Many private groups have dedicated themselves to rehabilitating injured eagles so that they can be released to the wild again.

The reclassification proposal was published in the July 12, 1994, *Federal Register*, and a final decision will be made by the FWS within one year. Public comments on the reclassification proposal are welcome, and should be sent by October 11, 1994, to the Chief, Division of Endangered Species, U.S. Fish and Wildlife Service, Bishop Henry Whipple Federal Building, One Federal Drive, Fort Snelling, Minnesota 55111-4056.

California Gray Whale

The California or eastern North Pacific population of the gray whale was officially removed from the List of Threatened and Endangered Species on June 15. A 1992 review by the National Oceanic and Atmospheric Administration (an agency of the Department of Commerce) showed that the population has increased from fewer than 10,000 animals in the late 1930's to about 21,000 animals, and is estimated to be about as large as in pre-whaling days.

"This is a great success story and a cause for celebration," said Commerce Secretary Ronald H. Brown. "Two tough Federal laws from the 1970's — the Marine Mammal Protection Act and the Endangered Species Act — have helped bring this animal back from a critically low population." Although the gray whale is no longer considered in danger of extinction, it will remain safeguarded by the Marine Mammal Protection Act. In addition, both the Mexican government, which has jurisdiction over the species' breeding area, and the International Whaling Commission have instituted protective policies.

Each winter, the California gray whale migrates 13,000 miles (20,900 kilometers) down the North American coast from its feeding grounds in the Bering Sea off Alaska to its breeding and calving ground grounds off Baja California, Mexico. It returns north in the spring at a rate of about 50 miles (80 km)per day.

Like other great whale species, the gray whale was extensively hunted for its oil, meat, hide, and baleen. The European population may have disappeared as early as 500 A.D., and the western Atlantic population probably survived no longer than the early 1700's. A geographically isolated population in the western North Pacific remains in serious peril and will remain listed as Endangered.

Report Chronicles Recovery

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pusillus), and Smoky madtom (*Noturus baileyi*) have responded favorably to management efforts. Progress has also been made in the recovery of plant species. Between 1989 and 1992, 79 percent of species added to the List of Endangered and Threatened Species were plants. Corresponding increases in plant research and recovery planning have produced encouraging results.

Much of this progress would not have been possible without the help of partnerships between the FWS and other Federal, State, and local governments and private organizations. The 1992 Recovery Report provides examples of many successful partnerships. In Michigan, cooperative efforts involving the U.S. Forest Service, Michigan Department of Natural Resources, and Michigan Audubon Society resulted in a 1992 increase in the Kirtland's warbler (*Dendroica kirtlandii*) population by 14 percent over the previous year, yielding the largest population of this species since 1961.

A similar partnership is paving the way for recovery of the Knowlton cactus (*Pediocactus knowltonii*) in New Mexico. The Bureau of Land Management, the New Mexico Department of Game and Fish, and The Nature Conservancy have worked with the FWS to reduce the threats of habitat loss and over-collection to this species by reintroducing two populations in the area surrounding its 10-acre (4-hectare) natural range. Another successful partnership formed in 1993 when the Georgia-Pacific Corporation entered an agreement with the Department of the Interior to protect Endangered red-cockaded woodpeckers (*Picoides borealis*) on over 4 million acres (1.6 million ha) of southern timberland. According to FWS Director Mollie Beattie, continued formation of partnerships will be critical to successful implementation of the ecosystem approach to fish and wildlife conservation.

Copies of the 279-page illustrated report (stock number 024-01000703-6) are available for $17.00 through the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Credit card orders may be placed by calling 202/783-3238.

Jennifer Heck, a biologist with the FWS Endangered Species Division in Washington, D.C., is Associate Editor of the Endangered Species Technical Bulletin.

Plant Conservation Blossoms With Creation of Native Plant Conservation Committee

by Joan E. Canfield

Most of our Nation's Endangered and Threatened species are plants, and the prospects for their survival brightened recently. On May 25, 1994, representatives of seven Federal agencies joined in Washington, D.C., to announce a new partnership to conserve native plants and their habitats.

The partnership, formalized under a Memorandum of Understanding, created the Federal Native Plant Conservation Committee (Committee). Interior Department agencies included in the partnership are the Fish and Wildlife Service, National Biological Survey, Bureau of Land Management, and National Park Service. The Department of Agriculture's Agricultural Research Service, Forest Service, and Soil Conservation Service also joined.

Recognizing the esthetic, ecological, educational, recreational, and scientific value of native plants, the signatories agreed "...to conserve and protect our native plant heritage by ensuring that, to the greatest extent feasible, native plant species and communities are maintained, enhanced, restored, or established on public lands, and that such activities are promoted on private lands."

To help accomplish this ambitious goal, the Committee will work with State and local organizations to identify and address key conservation needs for native plants and their habitats. It will also encourage education on the importance of plant resources, coordinate research, and provide a mechanism to share information among cooperating interests.

Why single out the plant kingdom? "The future of our public lands depends on native plants and plant communities," Fish and Wildlife Service Director Mollie Beattie said the day of the signing ceremony. "Plant biodiversity is the basis for healthy ecosystems, upon which all life depends. By working in a cooperative spirit, we can better manage these resources and avoid future conflicts."

photo by Joan Canfield

Lehua makanoe* (Lysimachia daphnoides), *a rare primrose with burgundy petals, is known only from bogs on the Hawaiian island of Kaua'i. Cooperative protection agreements developed as a result of the Memorandum may keep this miniature shrub, and many of the other 1,900 U.S. plants that are candidates for listing, from needing Endangered Species Act protection.

"Healthy ecosystems and sustainable development depend on native plants and plant communities," added Bureau of Land Management Acting Director Mike Dombeck. "The conservation and recovery of threatened and endangered species is a tremendous challenge. This partnership offers exciting opportunities for recovering species. We can work to prevent species from becoming threatened and endangered, which will provide great fiscal savings."

U.S. Senator Daniel K. Akaka of Hawaii, who hosted the May 25 ceremony, also praised the new program. "The agreement represents an important commitment to preserving our rich, living heritage of native plants for future generations. Because all the major Federal land managers will be party to this document, we can do a better job of preventing threatened native species from falling through the cracks." The enthusiastic audience of over 200 expressed delight at the strongly proactive role the Federal agencies took by signing this agreement.

Partnerships

Other Federal agencies with land or resource management responsibilities are expected to join the Committee in the near future. The Memorandum also encourages non-Federal organizations, whether State or private groups, to become official cooperators. Five organizations signed on at the May 25 ceremony: the Center for Plant Conservation, National Association of Conservation Districts, Soil and Water Conservation Society, Society for Ecological Restoration, and The Nature Conservancy. The Garden Club of America became a cooperator on June 30 at the Committee's second meeting, and many more such groups are expected to join in the near future. Cooperator status will provide a network through which organizations interested in plant conservation can pool and access plant databases, learn

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Heads of all seven Federal agencies voiced full support for the Memorandum of Understanding and its goals for native plant conservation. Seated, from left: John Reynolds, National Park Service; Jack Ward Thomas, Forest Service; Mike Dombeck, Bureau of Land Management; Mike Spear, Fish and Wildlife Service; Essex Finney, Jr., Agricultural Research Service. Standing, from left: Jeffrey Cooper-Smith, U.S. Botanic Garden (host); Agatha Hughes, Society for Ecological Restoration; Gerald Talbert, National Association of Conservation Districts; Norman Berg, Soil and Water Conservation Society; Paul Johnson, Soil Conservation Service; Bill Truslow, Center for Plant Conservation; Deborah Jensen, The Nature Conservancy; and Ron Pulliam, National Biological Survey.

Plant Conservation Blossoms

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how to duplicate locally successful projects, and discover new potential funding sources.

The initial goals of the Committee are to bring in additional partners, develop a strategic plan, and help set up regional task forces and national working groups. Regional groups will be the focal point for developing a prioritized list of sites for concerted plant conservation efforts. National working groups will focus on the four major program areas: conservation actions, databases/information exchange, education/public outreach, and research.

The Memorandum of Understanding was drafted at the North American Native Plant Conservation Strategy Workshop, held in March 1994 in Phoenix, Arizona. Over 80 participants from 34 organizations attended the highly successful meeting. They envisioned the creation of a public/private partnership to mobilize agencies, organizations, scientists, native plant societies, garden clubs, and amateur botanists throughout North America into a cohesive force to support local, national, and international habitat conservation efforts for plants. In that respect, the hope is to do for plants what the successful Partners in Flight program is doing for neotropical migratory birds.

Celebrating Wildflowers

The Memorandum was signed at a reception sponsored by the National Park Foundation at the U.S. Botanic Garden to celebrate National Wildflower Week (May 23 to May 29, 1994). Jack Ward Thomas, Chief of the Forest Service, said "The Forest Service is proud of our role as stewards of much of the nation's best wildflower habitat on Federal lands. We are anxious to convey to the public the special wonder and beauty of our plant resources, and the importance of native plant conservation to our overall mission of applying ecosystem management on National Forest System lands."

Already, several agencies have joined under the banner "Celebrating Wildflowers" to enhance public appreciation and knowledge of native plants. During National Park Week (May 23-May 29), National Park Service Director Roger Kennedy said "I can't think of a better way to celebrate the diversity of our park lands than through 'Celebrating Wildflowers.' To conserve the diversity within the 365 units of the National Park System, it will take a concerted effort of managing ecosystems, building partnerships, and sharing information and resources; exactly the things that are incorporated into this Memorandum of Understanding. We are proud to have played a part in making this happen."

The Committee looks forward to working with the growing number of partners. For details, including information on how to join as a cooperating organization, please contact the Federal Native Plant Conservation Committee. Write or call Ken Berg, Wildlife-Fisheries Division, Bureau of Land Management, Washington, D.C. 20240 (telephone 202/452-7764), or Joan Canfield, Division of Endangered Species, U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Room 452, Arlington, Virginia 22203 (telephone 703/358-2105).

Dr. Canfield, the Fish and Wildlife Service's representative on the Federal Native Plant Conservation Committee, is a biologist with the Division of Endangered Species.

Every Species Counts: Endangered Species in the National Forests and Grasslands

by Valerie C. Guardia

When Threatened and Endangered species and the U.S. Forest Service come to mind, many people think of spotted owls *(Strix occidentalis)* and the forest management controversy in the Pacific Northwest. But behind the headlines, the Forest Service has an important and growing conservation program — *Every Species Counts* — that reaches throughout the agency and is increasing its responsiveness to the needs of rare animals and plants.

Established in 1905, the Forest Service is a multiple-use agency within the U.S. Department of Agriculture. The agency manages 191 million acres (77 million hectares) of public land throughout the U.S. and its territories on 156 national forests and 20 national grasslands. The diversity of life and habitats found on these lands is incredible, ranging from subarctic tundra to tropical rainforest. Approximately 3,000 species of animals and 10,000 species of plants are known to live on these lands. Of those, more than 260 are federally listed as Threatened or Endangered. Approximately one-third of all federally listed species in the United States have at least some habitat on national forests and grasslands.

Program Overview

The *Every Species Counts* program was established in 1990. It brings together the resources and commitment of the Forest Service, other Federal and State agencies, private organizations, and concerned individuals to ensure that the habitats of Threatened, Endangered, and "sensitive" species on National Forest System lands are managed to enhance species conservation and recovery. "Sensitive" is a Forest Service term for species whose population viability is a concern and those that are official candidates for Federal listing under the Endangered Species Act.

With the help of the *Every Species Counts* program, the numbers of bald eagles *(Haliaeetus leucocephalus),* grizzly bears *(Ursus arctos horribilis),* peregrine falcons *(Falco peregrinus),* and many other species on national forests and grasslands have increased significantly in recent years. Partnerships with The Nature Conservancy, State Natural Heritage Inventory Programs, the Garden Clubs of America, the World Wildlife Fund, and other organizations and individuals across the country are making possible hundreds of projects to inventory, monitor, and restore rare species and their habitats, and to conserve rare ecosystems.

Plant conservation is one of three areas of emphasis under the *Every Species Counts* program. (See article in this edition of the *Bulletin* by Christopher Topik.) Nearly 100 federally listed and about 1,600 sensitive plants are found on national forest lands.

Another priority of *Every Species Counts* is aquatic wildlife, including rare fishes, amphibians, and aquatic reptiles, mollusks, and insects. Recent events, such as the listing of several Columbia and Snake River salmon *(Oncorhynchus* spp.) runs, have emphasized the importance and growing public awareness of rare fishes. Habitat for over 150 listed or sensitive fish species is managed by the Forest Service.

Terrestrial species comprise the third priority. This section of the program evolved around a relatively few well-known species, such as the spotted owl, grizzly bear, gray wolf *(Canis lupus),* and red-cockaded woodpecker *(Picoides borealis).* However, hundreds of other species have important needs as well, including the sandhill crane *(Grus canadensis),* wolverine *(Gulo gulo luscus),* and Uncompahgre frittilary butterfly *(Boloria acrocivena).* The *Every Species Counts* program is expanding to conserve these lesser known rare species.

Recovery

Recovery of listed species is a primary concern of the *Every Species Counts* program. The Forest Service works with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service to develop and carry out recovery plans for species occurring on national forests and grasslands. In the Pacific Northwest, for example, a recovery plan for the marbled murrelet *(Brachyramphus marmoratus)* is now being completed. Efforts to restore the grizzly bear and gray wolf continue in selected recovery areas of the western U.S. In the Southeast, recovery of the red-cockaded woodpecker is being attempted through such practices as the installation of artificial nest cavities and improved habitat management.

In a major shift, however, the Forest Service is joining the Fish and Wildlife Service in moving from an emphasis on single species towards a practice of

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Conserving the Oregon Silverspot Butterfly on Siuslaw National Forest

by Michael D. Clady

The Oregon silverspot butterfly *(Speyeria zerene hippolyta)* is restricted to cool, wet, marine grasslands along the Pacific Ocean from southern Washington to northern California. Aspects of the species' one-year life cycle, in particular a prolonged adult stage from June to September, help it adapt to persistent foggy and windy weather. Some adults emerge during periods of sunny, relatively calm weather. The females lay their eggs on or near common blue violet plants *(Viola adunca)*, which are the sole food source for the larvae.

The habitat of this butterfly and its foodplant, which must include low-growing, patchy grasses that do not crowd out the violets, is disappearing along the coast. Vegetational succession has turned many sites to brushy shrub and forest land, while others have been destroyed for homesites, towns, and tourist and recreational facilities.

By 1980, when it was listed by the Fish and Wildlife Service as a Threatened species, the silverspot was known only from one site, which was located on the Siuslaw National Forest along the central Oregon Coast. Since then, the species has been found at six other small sites on Federal, State, and private land. The butterfly is not abundant anywhere, and in a typical year there are fewer than 4,000 individuals distributed along 350 miles (560 kilometers) of coastline.

In 1983, the National Forest began to restore about 100 acres (40 hectares) of meadow habitat. In consultation with the Fish and Wildlife Service, we tried burning, introducing violet seeds and plants, mowing grass thatch, and removing invading trees and shrubs by machine or hand. A cautious approach was used. Treatments were confined to small plots outside of prime habitat where there was little risk of killing butterfly larvae.

photo by Paul Opler

Oregon silverspot butterfly

Mowing several times a year (every fourth or fifth year), particularly after the initial surge of growth in late spring or early summer, reduces grass thatch and often produces spectacular stands of blooming blue violets. Removing scattered stands of invading woody plants and maintaining shelter areas in the forest fringe has been relatively easy, and has opened up more areas for mowing. At present, burning is restricted largely to removing mowing residue and to clearing steep slopes where mowing is impossible.

Although efforts have not always been successful, results so far have exceeded our expectations. Adult silverspots heavily use many of the renovated areas, and three populations now are reasonably secure on the Siuslaw National Forest. A fourth, introduced population has maintained itself at a low level for 4 years. Overall, it seems that the species is on the way to recovery in Oregon.

Recent proposals for improving management of national forests in the region should promote biodiversity by perpetuating grasslands that support not only the butterfly but many other scarce animals and plants.

Micheal D. Clady is the Forest Fisheries Biologist and Silverspot Butterfly Coordinator for the Siuslaw National Forest in Corvallis, Oregon.

Every Species Counts

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managing by groups of species and/or communities. Addressing ecosystem conservation on a broad basis is being aided by a new Forest Service tool, the Habitat Conservation Assessment. Teams of researchers and managers compile information on a species' population status and trends, its habitat requirements, limiting factors, and effects of Forest Service activities on the species. This concept builds on the successes achieved with similar efforts, such as the Interagency Grizzly Bear Committee.

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Red-cockaded Woodpecker Management on Southern National Forests

by Dennis L. Krusac

Historically, red-cockaded woodpeckers *(Picoides borealis)* could be found throughout the pine forests of the southeastern United States from southern Oklahoma, Kentucky, and Maryland southward to Florida and westward to eastern Texas. Due to widespread habitat loss, however, the bird's range has been reduced primarily to public lands (mainly national forests) in the southern United States.

Although National Forest System lands comprise only about 6 percent of the forested lands in the South, 80 percent of the recovery objectives identified for this species are planned for Forest Service lands. Because this habitat is so critical, the Forest Service has developed a specific red-cockaded woodpecker management strategy for the southern national forests.

Habitat management first involves delineating areas that encompass the desired future area for a red-cockaded woodpecker population at a landscape scale. The intent is to manage an area large enough to avoid or overcome the adverse effects of habitat fragmentation and to reduce the risks inherent with small populations. The average size of such a habitat management area is 74,475 acres (30,140 hectares). These habitat management areas may total more than 3 million acres (1.2 million ha).

Small, widely dispersed populations are more susceptible to extirpation than large populations. For this reason, red-cockaded woodpecker populations with fewer than 40 potential breeding pairs receive more intensive management on national forests, and their habitat receives greater protection from competing uses (such as logging). Populations with more than 400 potential breeding pairs are considered secure. They receive less intensive management, and there are fewer restrictions on other activities.

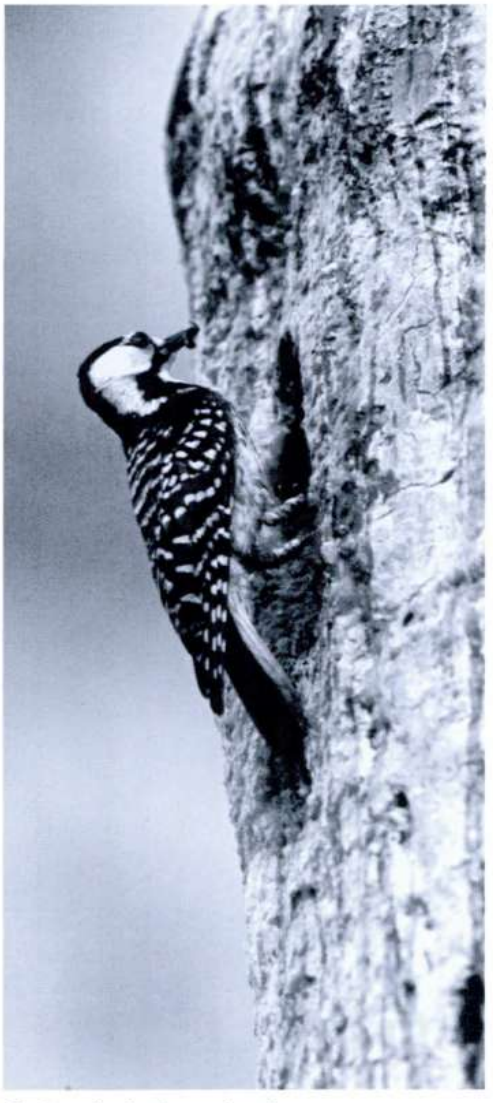

photo © John and Karen Hollingsworth

Red-cockaded woodpecker

One example of habitat management for the red-cockaded woodpecker is the use of prescribed burning. When naturally occurring wildfires are suppressed, a dense hardwood midstory can develop, altering the more open habitat conditions favored by the woodpecker. The recovery plan emphasizes prescribed burning for midstory control every 3 to 5 years. This mimics the natural fire regime and improves habitat conditions.

Habitat management at a landscape scale with a more natural disturbance regime will not only help the woodpecker, but should have benefits to overall biological diversity. Another 167 Threatened, Endangered, or sensitive plant and animal species should benefit from the proposed management strategy. Its implementation could preclude the need to list some of these species.

Extended timber harvest rotation cycles in southern forests also can benefit the woodpecker. The recovery strategy sets a 120-year rotation for longleaf and shortleaf pine, and a 100-year rotation for loblolly and slash pines. These extended rotations are based on the bird's preference for older trees in which to excavate nesting cavities. It is essential that proper rotations be implemented and a balanced tree age/size class distribution achieved to provide adequate habitat in the future.

Providing artificial nesting cavities will be used to increase the number of potential breeding sites and to stimulate colonization of unoccupied habitat. Artificial cavities have also proven effective in stabilizing populations following nesting tree loss from natural causes, such as hurricanes.

Another form of intensive management involves the translocation of juvenile birds to create potential breeding pairs. Translocations have been successful, but they must be used in conjunction with artificial cavities and midstory control to be truly effective.

These actions, as outlined in the red-cockaded woodpecker management strategy, are a substantial contribution to the recovery of the longleaf pine ecosystem and other southern pine-dominated ecosystem types.

Dennis L. Krusac is an Endangered Species Specialist with the Forest Service at its Southern Regional Office in Atlanta, Georgia.

Recovering Citico Creek Fishes in the Cherokee National Forest

by Jim Herrig

The Southern Appalachian Mountains are widely known for their ecological diversity. The phrase "...the greatest variety of plants in North America occurs in these mountains..." is often cited by authors to emphasize the richness of species that occur here. Frequently, however, the equally diverse aquatic fauna goes unrecognized.

Citico Creek is a moderately sized, but biologically rich, stream in the mountains of eastern Tennessee. At least 51 species of fish have been collected from its watershed. These, plus the many salamander, frog, insect, and mussel species, are enough to keep aquatic ecologists busy for years.

With all of these species competing in the same body of water, ecological niches are very narrow. Consequently, habitat for many of the species is limited. Five of these species have such restricted habitat requirements in Citico Creek and throughout their range that they are federally listed as Threatened or Endangered. Two of these species are catfish, the Smoky madtom *(Noturus baileyi)* and yellowfin madtom *(Noturus flavipinnis)*.

Since the early 1980's, biologists with the Cherokee National Forest have studied and monitored the populations of these fish in cooperation with the University of Tennessee, Tennessee Wildlife Resources Agency, U.S. Fish and Wildlife Service, Great Smoky Mountains National Park, and a private organization, Conservation Fisheries, Inc. Research on the life histories of both species was funded by these cooperators. Annual population monitoring began in 1986. Collection of nests with eggs, followed by captive propagation in aquariums, came next.

Both catfish are tiny, nocturnal bottom-dwellers that spend most of their lives under rocks. They spawn during June in excavated cavities. Males guard the eggs and provide some protection from scavenging crayfish, salamanders, and other fish. The guarding instinct is so strong that when the slab rock is lifted for inspection of the nest, the male does not leave the area. This trait enables biologists to collect both the nest and the male madtom.

photo by J.R. Shute, Conservation Fisheries, Inc.

snorkling for madtoms in Citico Creek

Although successful spawning in aquariums has not yet been achieved, wild-collected eggs of both species have hatched in captivity, and fry have been reared to a size large enough for release. The fry are being stocked into Abrams Creek in the Great Smoky Mountains, another stream in which both species are believed to have occurred. If populations can be established in Abrams Creek, these species will be brought a step back from the brink of extinction.

Intensive surveys of the yellowfin and Smoky madtoms are expensive and might be detrimental to the fish. Therefore, careful surveys with minimum potential for adverse impacts are conducted. These surveys take place under low flow conditions at night using snorkel gear and spotlights.

In 1990, the population trend for the yellowfin madtom appeared to be steeply downward. The cooperators therefore decided 1) to take only one yellowfin nest from Citico Creek in 1991, 2) to stock all of the juveniles that were reared back into Citico Creek (68 total), and 3) not take any nests from Citico Creek in 1992.

In 1993, the yellowfin madtom population index suggested a strong upward trend. Two nests were collected, and all 113 of the juveniles produced were released back into Citico Creek. The 1994 survey has begun, and the number of yellowfins looks promising.

Because Citico Creek holds the only known Smoky madtom population, it is imperative to reestablish this species in another stream within its historic range. Since the Smoky madtom population trend from 1990 through

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The National Forest System Rare Plant Conservation Program

by Christopher Topik

From forests to grasslands, the National Forest System contains some of America's best habitats for wildflowers and other plants. We estimate these lands support more than 10,000 species of vascular plants and untold numbers of non-vascular plants.

Nearly 100 of these plants are listed federally as Endangered or Threatened, and more than 1,700 others have been designated by the Forest Service as sensitive. Over half the Threatened and Endangered plant species we manage are found within our southeastern region, which ranges from Virginia to Texas, and includes the Caribbean National Forest in Puerto Rico. Although most of the national forests in this region are small, their importance is magnified by the fact that they comprise a large proportion of the public land in the southeast that is managed for conservation purposes.

The National Forest Management Act commits our agency to maintaining a diversity of plant and animal communities throughout the National Forest System. In recent years, the National Forest Service's rare plant program has grown tremendously. Over 120 full-time botanists in the agency are now involved primarily with plant conservation, and they provide a wealth of local field botany expertise. We work closely with other Federal and State agencies, and collaborate extensively with State natural heritage programs and The Nature Conservancy on survey and data management. Cooperation with volunteer groups (such as the Garden Club of America) and botanical gardens associated with the Center for Plant Conservation also increases our ability to inventory and conserve rare plants. We welcome conservation partnerships with others interested in plant conservation.

Because conservation efforts are more effective when they are launched before species become Endangered or Threatened, the Forest Service is compiling habitat management strategies for sensitive species. Over 100 such plant conservation strategies have been completed or are well under way. This number will increase as we work with fellow Federal agencies to implement a Memorandum of Understanding (MOU) signed January 25 by agency heads of the Forest Service, Bureau of Land Management, Fish and Wildlife

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Recovering Citico Creek Fishes

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1994 appeared stable to upward, the cooperators decided to continue with attempts to restore the species to Abrams Creek in the Great Smoky Mountains National Park. Aquarium-reared fry were released each year from 1990 to 1992. Night snorkeling surveys in Abrams Creek located a few surviving Smoky madtoms in 1990 and 1991, but none were observed in 1992. No evidence of natural reproduction has been documented. Once successful spawning occurs, the likelihood of finding individual Smoky madtoms will increase greatly.

During 1989-1991, when the yellowfin madtom population index was so low, it was comforting to know that some individuals were being held in an experimental captive breeding program. Because of the success in rearing these fish in captivity, we were able to contribute significantly to the status of the Citico Creek population. Full recovery of this species and several others in the southern Appalachian Mountains will be assured only by habitat restoration, successful captive breeding programs, and the establishment of reintroduced populations.

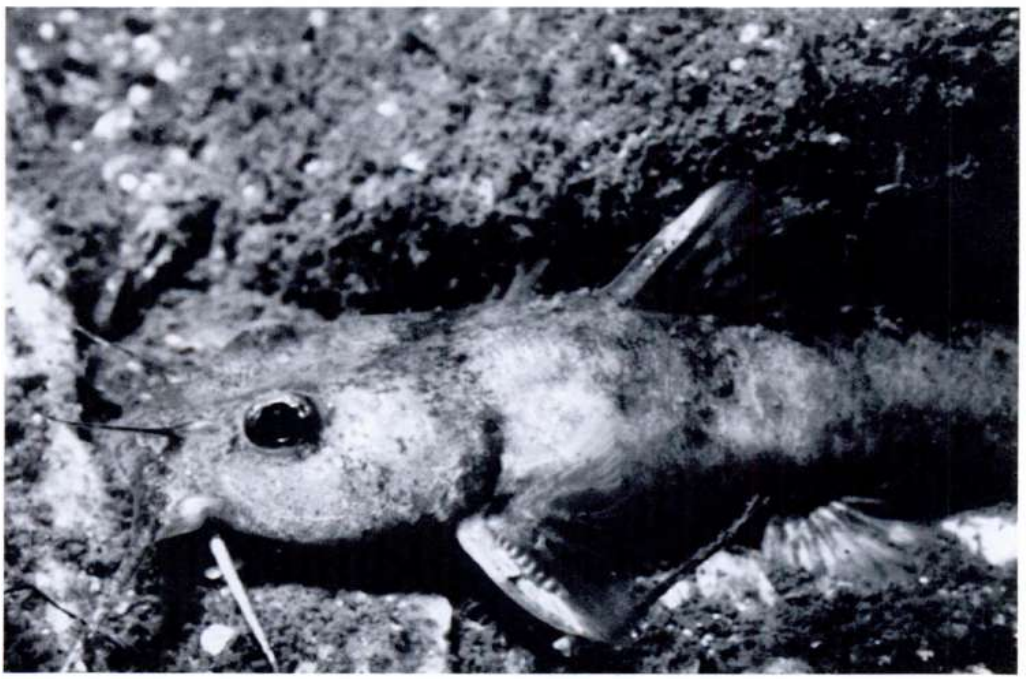

photo by J.R. Shute, Conservation Fisheries, Inc.

yellowfin madtom

Jim Herrig is the Forest Biologist for the Cherokee National Forest in Cleveland, Tennessee.

Rare Plant Conservation

(continued from page 12)

Service, National Park Service and National Marine Fisheries Service. Its purpose is to address the needs of vulnerable species — animals as well as plants — in time to secure sustainable populations, thereby making Endangered Species Act protection unnecessary.

Recently, the Forest Service joined a number of Federal agencies in another conservation effort, this time to develop an integrated strategy aimed specifically at native plants. The agreement was formalized by creation of the Federal Native Plant Conservation Committee. The Committee will promote the sharing of expertise and resources, assist in the development of consistent scientific methodologies, encourage collaborative training programs, and support new ecosystem management efforts.

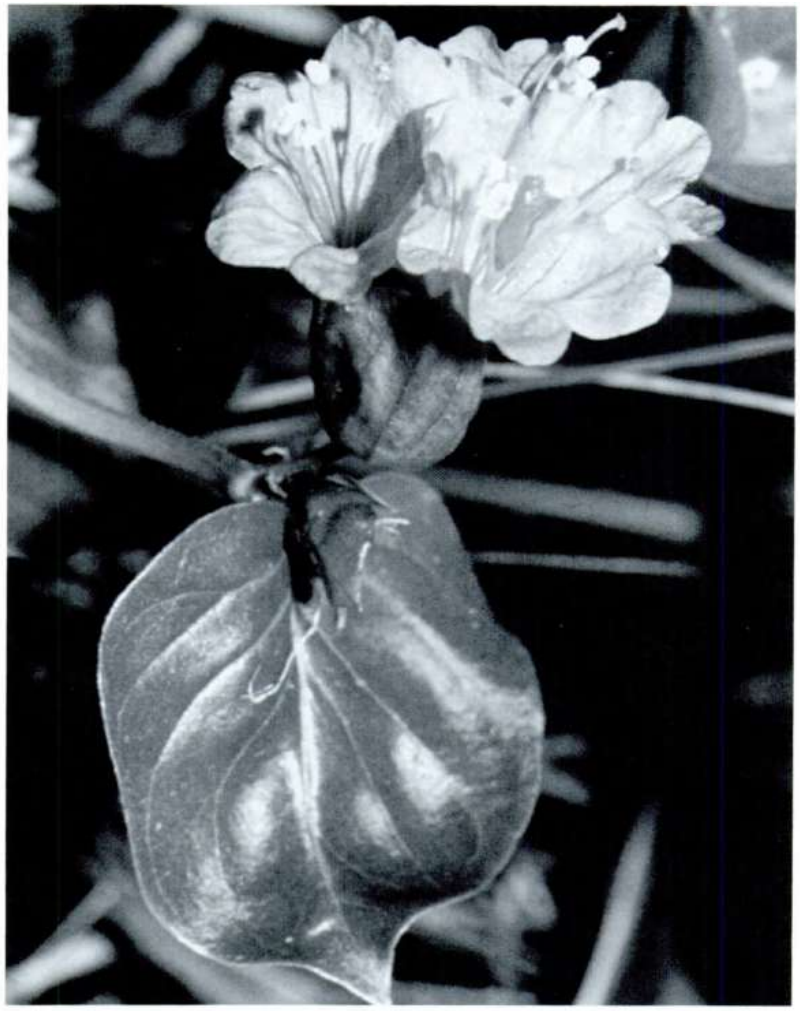

photo by Paula Brooks

The status of MacFarlane's four-o'clock, a wildflower native to parts of Idaho and Oregon, is now more secure because of Forest Service changes in habitat management and recovery efforts carried out in cooperation with the Bureau of Land Management and the Fish and Wildlife Service.

Plant conservation on the national forests and grasslands can include many different kinds of activities:

- **Inventories** — Although botanists conduct species inventories on the National Forest System for specific project areas, they also participate in integrated searches of larger ecosystem or management jurisdictions. New species are still found every year, and range extensions are not uncommon. For instance, two of our regional botanists, Duane Atwood from Ogden, Utah, and Jim Shevock from San Francisco, have discovered numerous new species, and they each have seven species named in their honor.

- **Recovery** — Implementing recovery plans for listed species is an important part of the Forest Service rare plant program. For example, our botanists have conducted prescribed burns to create open habitat needed by the mountain golden heather *(Hudsonia montana)* in North Carolina, and reintroduced Mead's milkweed *(Asclepias meadii)* in southern Illinois. Working with several other agencies, we have helped secure MacFarlane's four-o'clock *(Mirabilis macfarlanei)*, enabling the Fish and Wildlife Service to propose reclassifying this wildflower from Endangered to the less critical category of Threatened.

- **Resource coordination** — Forest Service botanists are now participating on interdisciplinary teams to guide such activities as timber harvest, livestock grazing, mining, road building, forage or wildlife habitat enhancement, land exchanges, and recreational development. By becoming involved early in the process, the needs of plants and rare habitats can usually be accommodated.

- **Restoration and rehabilitation** — On Earth Day 1994, President Clinton called for use of regionally native species in Federal landscaping and restoration projects. We are collaborating with native plant experts, such as the Redwood City Seed Company in California and the Soil Conservation Service, to develop local stock for planting in damaged areas. As we move forward with ecosystem management, watershed restoration will be a growing role for the Forest Service, and the use of native species for rehabilitation will increase.

- **Special forest products** — The collection of forest botanical products for personal and commercial uses is increasing, and in some areas could play a large role in rural economic diversification. A surprisingly long list of vascular plants, bryophytes, and fungi have high economic value. It is imperative that development of this industry be preceded by resource inventories and estimates of sustainable harvest levels. Monitoring plant population impacts and potential plant misidentifications also will be important roles for botanists.

- **Exotic species control** — The introduction and spread of non-native plants and animals is emerging as one of the greatest threats to the integrity of national forest and grassland ecosystems. Forest Service botanists are increasingly being called upon to assist

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Rare Plant Conservation

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other resource managers with identifying problem areas and planning treatments.

• **Public education, recreation, and outreach** — Two years ago, the Forest Service's Pacific Northwest Region created a new event, "Celebrating Wildflowers - Wildflower Week," as an umbrella to foster appreciation for native plants and the role of public lands in their conservation. This effort has now gone national, with the Bureau of Land Management and National Park Service as full partners. Several hundred activities — from hikes to classroom presentations, festivals, restoration projects, and displays — took place this spring and summer. We look forward to continued growth in this effort as we welcome new partners.

• **Ecosystem management planning** — With the shift toward ecosystem management, Forest Service botanists are becoming involved in a variety of planning projects, ranging from evaluating natural communities to prioritizing the special needs of unique habitats. At the San Bernardino National Forest in California, for example, we collaborated with The Nature Conservancy to protect the rare "pebble plains" habitat in the Big Bear Lake area. These unusual, shallow-soil prairies are home to more than 10 endemic plants.

Although there may be many definitions of "ecosystem management," its success will be measured by how well the soil, water, and populations of native plants and animals are conserved for future generations to use and enjoy.

Dr. Topik is Leader of the Forest Service's National Botany Program, USDA-Forest Service, P.O. Box 96090, Washington, D.C. 20090-6090.

Endangered Species Information Now Available Through Internet

The Fish and Wildlife Service recently placed several electronic information items on its Information Resources Management Library Server, which makes these items accessible to users of Internet and the Service's Wide Area Network. These items include:

- The List of Threatened and Endangered Species (entitled, "Endangered and Threatened Wildlife and Plants"), current as of June 30, 1994, and to be updated monthly;
- The Plant Notice of Review (entitled "Plant Taxa for Listing as Endangered or Threatened Species, Notice of Review"), as published September 30, 1993;
- The Endangered Species Act of 1973, as amended through the 100th Congress;
- Species Maps that indicate listed species and proposed species by state and territory, current as of June 1, 1994;
- Species Maps that indicate Category 1 listing candidates and candidate species by state and territory, current as of December 31, 1993.

The Library Server can be accessed through cc:mail within the Service and through Internet E-mail software from outside the Service. If you address a new cc:mail message to R9IRMLIB (the Library Server's cc:mail address), type the retrieval command — Send ES Instructions — on the subject line and send the message, you will receive the complete list of "send" messages (retrieval commands) available on the Library Server for the Endangered Species Program. This list will change over time as more information is added to the Library Server. For example, the new Animal Notice of Review will be added once it has been published in the *Federal Register.*

Those from outside the Service with Internet E-mail capabilities should use R9IRMLIB@mail.fws.gov (the Library Server's Internet address) to access the above information.

Every Species Counts

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Preventing the Need to List

Habitat Conservation Assessments are being completed for such species as the bull trout *(Salvelinus confluentus);* the inland cutthroat trout *(Oncorhynchus* spp.); the northern goshawk *(Accipiter gentilis);* the great gray owl *(Strix nebulosa),* flammulated owl *(Otus flammeolus),* and boreal owl *(Aegolius funereus);* and carnivores such as the fisher *(Martes pennanti pacifica),* pine marten *(Martes americana),* lynx *(Felis lynx canadensis),* and wolverine. By acting early and adapting land management activities when necessary, we hope to foster secure populations of these species, avoiding the need to list them as Endangered or Threatened.

Conserving species before they decline to the point of needing Endangered Species Act protection is a major goal of *Every Species Counts.* The Forest Service addresses this goal through its sensitive species program, which began in 1982. By identifying sensitive species and taking voluntary actions to reduce impacts to their habitat, we can reduce the number of future listings. National forest lands provide habitat for 2,344 species designated as sensitive.

In some situations, large-scale habitat management policies are adopted. The case of the northern goshawk *(Accipiter gentilis)* provides a good example. This raptor is designated as a sensitive species in five of the Forest Service's nine regions, and is considered a Category 2 listing candidate by the Fish and Wildlife Service. Because of continued threats to goshawks and their habitat in the southwest (Arizona and New Mexico), the Forest Service established an interim management policy to protect known nesting sites and provide management guidelines for a 6,000-acre (2,430-ha) area around each site. An environmental impact statement is being completed to formally adopt this policy and amend forest management plans regionwide. In addition, the Forest Service is a member of the Goshawk Interagency Implementation Team, which is developing policy for managing the species on all Federal lands.

In January 1994, the Forest Service joined four other Federal agencies (Bureau of Land Management, Fish and Wildlife Service, National Park Service, and National Marine Fisheries Service) in signing a Memorandum of Understanding on vulnerable wildlife. All five agencies agreed to cooperate in managing these species to prevent the need for listing them under the Endangered Species Act. Specific conservation agreements have been developed for such animals as the Coeur d'Alene salamander *(Plethodon idahoensis),* northern bog lemming *(Synaptomys borealis sphagniaola),* bull trout, and Wet Canyon talussnail *(Sonorellax macrophallus).* The Forest Service is also helping to develop a new strategy for conserving North America's native plants. (See the article in this edition of the *Bulletin* by Joan Canfield.)

Research

Forest Service scientists are conducting research on more than 75 Threatened, Endangered, and sensitive species in aquatic and terrestrial systems. For example, agency scientists have worked with the Fish and Wildlife Service to study the Puerto Rican parrot *(Amazona vittata)* and factors related to its nesting success, competition, predation, pair formation, and genetics. In addition, they helped develop techniques for artificial cavities to improve nesting habitat. In 1968, the Forest Service also started research on the red-cockaded woodpecker. Research on artificial nesting cavities led to their use as an intensive management tool in red-cockaded woodpecker recovery. These structures have been key to a significant increase in the species' population after it was devastated by Hurricane Hugo.

Learning From Controversy

Despite the efforts of the *Every Species Counts* program, controversy surrounding the management of some listed and sensitive species continues. Fortunately, this challenge often results in improved policies and management. The situation in the Pacific Northwest is an example. Public concern for old-growth forests and the species they support, including the northern spotted owl, generated a great deal of forest research. The findings confirmed that the spotted owl is only one of many species dependent on old-growth forests.

This research on the northern spotted owl enabled the Clinton Administration and the Forest Service to propose far-reaching changes in the management of national forests in this region. These proposed changes are embodied in the "Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl," otherwise known as "The President's Northwest Forest Plan." What began as a set of guidelines for a single species was expanded to address the needs of over 1,000 species associated with old-growth forests.

A Challenging Future

Knowledge of many vulnerable species and ecosystems on lands managed by the Forest Service is still limited. Our emphasis in coming years will be on completing much-needed inventories, research studies, and population and habitat monitoring. This new information will enable us to focus on recovery and restoration in 14 major ecological areas, from the Great Basin to the tropical forests of Puerto Rico. Many new partnerships will be forged and strengthened between the *Every Species Counts* program and other agencies, conservation organizations, civic groups, and individuals as we shift to an ecosystem-based approach to conservation.

Valerie C. Guardia is Assistant National Program Manager for the Forest Service's Threatened, Endangered, and Sensitive Species Program in Washington, D.C.

Listing Proposals — April/May 1994

Eleven species — five animals and six plants — were proposed by the Fish and Wildlife Service (FWS) during April and May 1994 for listing as Endangered or Threatened. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Saint Francis' Satyr *(Neonympha mitchellii francisci)*

One of the rarest butterflies in North America, the Saint Francis' satyr is endemic to the sandhills region of North Carolina. After this subspecies was described in 1989, collectors flocked to the site where it was first found, and the satyr was soon reported to be extinct. Fortunately, a small population was found recently. Because of its low numbers, restricted range, and continuing vulnerability to collection, the Saint Francis' satyr was proposed April 18 for listing as Endangered. The potential threat posed by collectors, including commercial dealers, is so severe that the FWS also issued an emergency rule giving the butterfly immediate protection for a period of 240 days, during which the FWS will seek permanent protection for the species. Biologists hope this unusual action will enable the satyr to survive its 1994 flight season.

Saint Francis' satyr habitat consists of open, wet meadows dominated by sedges. This butterfly likely had a broader distribution before widespread environmental changes in the southern coastal plain altered or destroyed much of the habitat. Its northern relative, Mitchell's satyr *(Neonympha mitchellii mitchellii)*, was listed in 1992 as Endangered, also because of overcollection and habitat loss.

Periodic fires associated with silvicultural practices, wildlife habitat management, and other activities are the main reason the Saint Francis' satyr survives in this area. No serious conflicts with existing land use practices are expected.

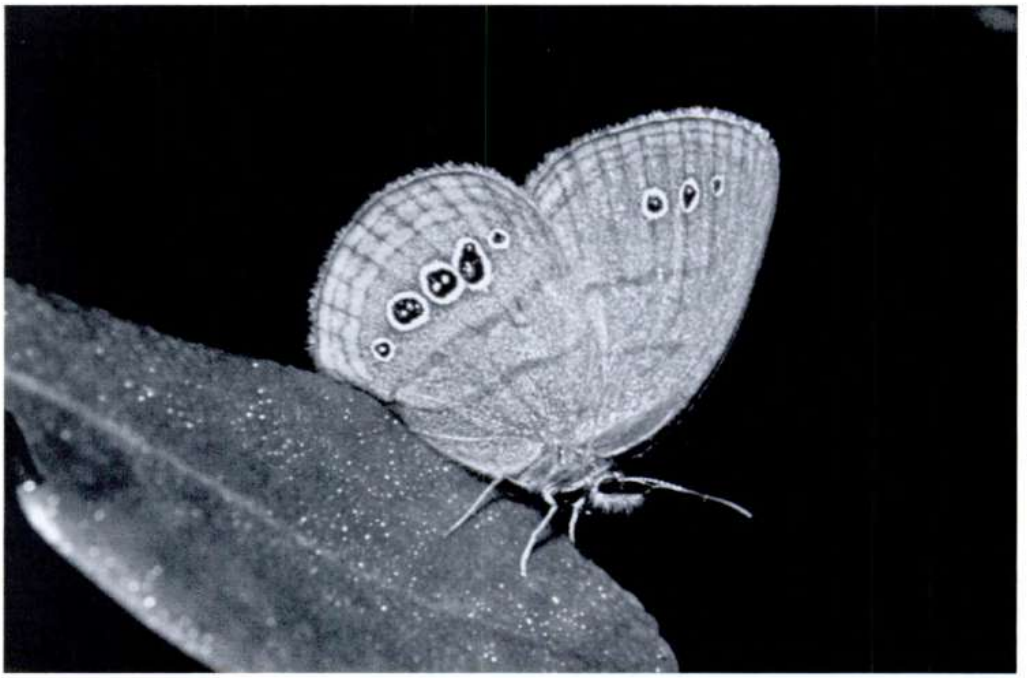
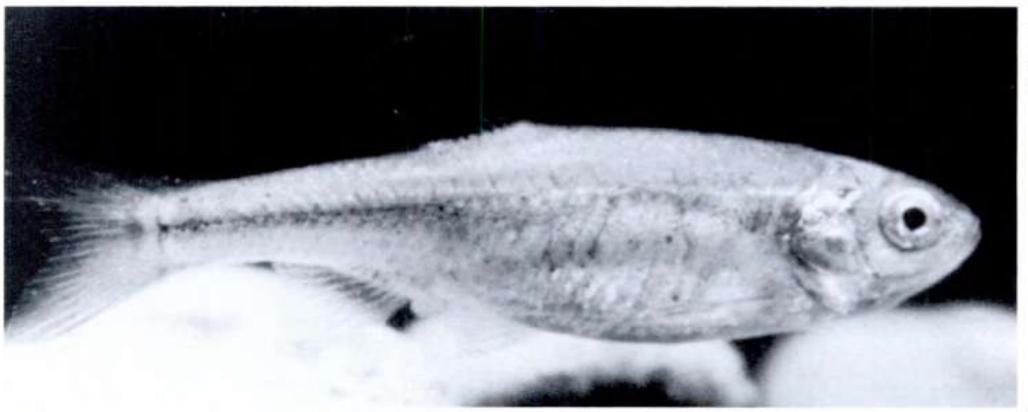


photo by Steve Hall/North Carolina Natural Heritage Program

Saint Francis' satyr is a fairly small, dark brown butterfly with conspicuous "eyespots" on the lower surfaces of the wings. The spots are dark maroon brown in the center, surrounded by a straw yellow band.



FWS photo

The Virgin spinedace is a small fish up to 5 inches (2 centimeters) in length, with a broad, flat, silvery body.

Virgin Spinedace *(Lepidomeda mollispinis mollispinis)*

The Virgin spinedace is a small fish in the minnow family. As its common name suggests, this subspecies is endemic to the Virgin River system, which drains parts of southwestern Utah, northwestern Arizona, and southeastern Nevada. Widespread habitat fragmentation, introductions of non-native fish species, and dewatering due to agriculture, mining, and urbanization have eliminated the Virgin spinedace from approximately 40 percent of its historical habitat. Because these factors pose continuing threats, the FWS proposed May 18 to list the spinedace as Threatened.

Although its habitat preferences may vary, the Virgin spinedace is usually found in clear, cool, free-flowing streams that are interspersed with pools, runs, and riffles. Much of this habitat has been fragmented or destroyed by impoundments. Diversion structures have removed most or all of the water from some other areas. Livestock and mining operations in floodplains and riparian zones can further degrade the habitat by contaminating surface water.

(continued on page 20)

Listing Proposals

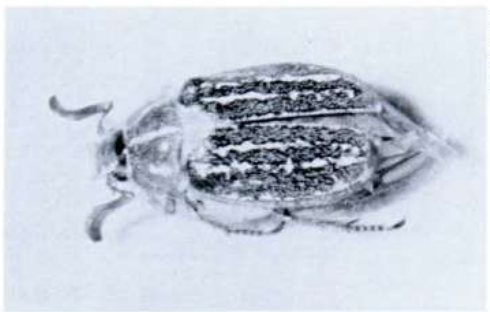
(continued from page 19)

Predation and competition from introduced non-native fishes is a significant threat to several fish species in the Virgin River system, including the spinedace. Control of harmful exotic species is expected to play an important part in its restoration, along with rehabilitating and protecting important habitat.

Three California Insects

Three species of insects limited to a small portion of the Santa Cruz Mountains in Santa Cruz County, California, were proposed May 10 for listing as Endangered:

• **Mount Hermon June beetle** ***(Polyphylla barbata)*** - a small scarab beetle with a black head, dark blackish-brown front wings clothed with scattered long hair, and a striped body.



FWS photo

Mount Hermon June beetle

• **Zayante band-winged grasshopper** ***(Trimerotropis infantilis)*** - a small grasshopper with a pale gray to light-brown body, and dark crossbands on the forewings.

• **Santa Cruz rain beetle** ***(Pleocoma conjugens conjugens)*** - a large beetle that is reddish-brown to black in color, with long hairs on the ventral surface.

All three insects are restricted to small, pockets of a unique habitat type — ponderosa pine sand parklands — that are scattered within a 20-square-mile (52-square-kilometer) area. Because of their disjunct distribution, these areas have been referred to as "biological islands." The amount of habitat historically occupied by the three insects totalled only about 500 acres (200 hectares). By 1992, however, human activities in the Santa Cruz Mountains had reduced the range to less than 100 acres (40 ha).

Urbanization, off-road vehicle use, recreational development, sand mining, certain agricultural practices, and alteration of natural fire regimes have contributed to the degradation or destruction of the insects' habitat, and pose continuing threats.

Five California Plants

Five plant taxa native to the foothills of the central Sierra Nevada were proposed April 20 for Endangered Species Act protection. Listing as Endangered was proposed for the four in most immediate danger:

• **Stebbins' morning-glory** ***(Calystegia stebbinsi)*** - a perennial herb in the family Convolvulaceae with white flowers and distinctively lobed leaves.

• **Pine Hill ceanothus** ***(Ceanothus roderickii)*** - a prostrate evergreen shrub in the buckthorn family (Rhamnaceae) that has whitish flowers tinged with blue.

• **Pine Hill flannelbush** ***(Fremontodendron californicum* ssp. *decumbens)*** - a speading shrub in the cacao family (Sterculiaceae) with light orange to reddish flowers.

• **El Dorado bedstraw** ***(Galium californicum* ssp. *sierrae)*** - a small perennial herb in the coffee family (Rubiaceae) with pale yellow flowers clustered at the tips of its stems.

Because the situation facing the fifth plant is not as critical, it was proposed for the classification of Threatened:

• **Layne's butterweed** ***(Senecio layneae)*** - a perennial herb in the aster family (Asteraceae) with several yellow flower heads, each having 5 to 8 ray flowers.

All five plants are found primarily on gabbro or serpentine soils within chaparral or oak woodlands in western El Dorado County. There are also a few isolated locations in Nevada and Tuolumne Counties. The primary threat facing these plants is continuing habitat loss. Many sites have been fragmented, damaged, or even destroyed by one or more of the following: urbanization, road construction and maintenance, off-road vehicle use, land clearing, and mining. El Dorado County, which has a projected growth rate of over 50 percent between 1990 and 2005, is one of the most rapidly growing counties in California.

Fire suppression, which accompanies development, has altered natural ecological processes within a number of plant communities in California. It poses a threat to four of the proposed plants, which evolved within fire-adapted habitat. Periodic fire is important for germination of their seeds and eliminates shading from competing vegetation. In a study of controlled burning at a site in El Dorado County, fire caused a 22-fold increase in germination of the Pine Hill ceanothus. In addition, the growth rate of seedlings was greater in the burned site than in a nearby unburned area.

Golden Paintbrush *(Castilleja levisecta)*

Brilliant golden yellow flower bracts give this perennial herb its common name. A member of the snapdragon family (Scrophulariaceae), the golden paintbrush grows to a height of about 20 inches (0.5 meter). It occurs in low-elevation grasslands on glacially derived soils of the Puget Trough.

Historically, the plant could be found from the Willamette Valley in Oregon north to Vancouver Island in British Columbia. Only 10 disjunct populations remain, some of them very small, and the species is now extirpated in Oregon. On May 10, the FWS proposed to list the golden paintbrush as Endangered.

Although some paintbrush sites were destroyed by urbanization or agricultural conversion, the loss of grassland habitat to encroachment by native and exotic woody plants is the main reason for the decline. Open coastal prairies once were maintained by periodic

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Final Listing Rule Approved for Two Aquatic Snails

Two species of freshwater snails were listed April 15, 1994, as Endangered. The **royal snail** ***(Pyrgulopsis ogmorphaphe)*** is known only from two spring runs within the Sequatchie River system in Marion County, Tennessee. It is small, usually less than 0.25 inch (5 millimeters) in length, has a conical shell, and is dark brown to black in color. Two small populations of **Anthony's riversnail** ***(Athearnia anthonyi)*** occur at sites in the Sequatchie River (also in Marion County) and Limestone Creek in Limestone County, Alabama. This species once had considerably wider range.

Both species are vulnerable to habitat degradation. Threats to water quality include siltation; road construction; logging; cattle grazing; and pollution from agricultural, municipal, and industrial runoff.

photo by John Gamon/Washington Natural Heritage Program

The golden paintbrush is named for its brilliant golden yellow flower bracts.

Listing Proposals

(continued from previous page)

wildfires, but fire suppression has allowed the spread of invasive shrubs that shade the golden paintbrush and compete for space and nutrients. Efforts to remove competing vegetation mechanically or by hand have been attempted, but these methods have proven expensive and labor intensive.

Available Conservation Measures

Among the conservation benefits authorized for Threatened and Endangered plants and animals under the Endangered Species Act are: protection from being jeopardized by Federal activities; restrictions on take and trafficking; a requirement that the FWS develop recovery plans and take conservation actions; authorization to seek land purchases or exchanges for important habitat; and Federal aid to State and Commonwealth conservation departments with cooperative endangered species agreements. Listing also lends greater recognition to a species' precarious status, encouraging other conservation efforts by State and local agencies, independent organizations, and concerned individuals.

Section 7 of the Act directs Federal agencies to use their legal authorities to further the purposes of the Act by carrying out conservation programs for listed species. It also requires these agencies to ensure that any actions they fund, authorize, or carry out are not likely to jeopardize the survival of any Endangered or Threatened species, or to adversely modify its designated Critical Habitat (if any). When an agency finds that one of its activities may affect a listed species, it is required to consult with the FWS to avoid jeopardy. If necessary, "reasonable and prudent alternatives," such as project modifications or rescheduling, are suggested to allow completion of the proposed activity. Where a Federal action may jeopardize the survival of a species that is *proposed* for listing, the Federal agency is required to "confer" with the FWS (although the results of such a conference are not legally binding).

Additional protection is authorized by Section 9 of the Act, which makes it illegal to take, import, export, or engage in interstate or international commerce in listed animals except by permit for certain conservation purposes. The Act also makes it illegal to posses, sell, or transport any listed species taken in violation of the law. For plants, trade restrictions are the same but the rules on "take" are different. It is unlawful to collect or maliciously damage any Endangered plant on lands under Federal jurisdiction. Removing or damaging listed plants on State and private lands in knowing violation of State law, or in the course of violating a State criminal trespass law, also is illegal under the Act. In addition, some States have more restrictive laws specifically against the take of State or federally listed plants and animals.

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conservation — that is, they illustrate the importance of wetlands and highlight the enjoyment of outdoor activities such as hunting, fishing, and birding. Through "hands-on" items, including a coffee filter and a sponge, these trunks help show how wetlands absorb pollutants and prevent floods, benefitting the environment and its inhabitants, including people.

The other four trunks show the need to protect Endangered species, demonstrating their appeal through such specimens as ocelot *(Felis pardalis)* pelts and mounted hawskbill sea turtles *(Eretmochelys imbricata)*. Provided by the FWS Forensics Laboratory in Ashland, Oregon, these wildlife articles were confiscated after being involved in violations. "Recycled," they have become valuable teaching aids.

Like "Project Wild," another educational program, these resource trunks are funded through Federal Aid accounts. The trunks are designed for use by students in grades K through 12, and are available to teachers in public, private, and parochial schools, as well as home-schoolers and youth conservation organizations. For more information, contact Dorothy Deas in the FWS Austin Office, 300 E. 8th Street, Room G-167, Austin, Texas 78701 (telephone 512/482-5454).

*****

The Houston toad (*Bufo houstonensis*) was the subject of a Population and Habitat Viability Analysis Workshop held May 23-25, 1994, in Austin, Texas. The 3-day seminar involved public and private organizations in consensus-building to promote the survival and recovery of this Endangered species. Participants included the National Fish and Wildlife Foundation, the Lower Colorado River Authority, and the FWS, among others. The result was a revised recovery plan that will lay the biological groundwork for habitat conservation planning for this species.

The FWS Austin Office recently conducted two public meetings in Bastrop County, Texas, to discuss ways protect the toad while allowing development of a growing community.

*****

Region 3 - Officials at Crab Orchard National Wildlife Refuge in Illinois plan to turn two World War II era munitions bunkers into artificial bat caves. Plans include altering the surface on the bunker ceilings and walls to give them a more "attachable" surface for roosting bats. Temperature regulation in the bunkers may enable them to provide breeding and wintering habitat for the little brown bat (*Myotis lucifugus*), the Endangered gray bat (*Myotis grisescens*), and the Endangered Indiana bat (*Myotis sodalis*).

*****

The Rock Island, Illinois, and the Twin Cities, Minnesota, Field Offices have worked together to reformulate a Higgins' eye pearly mussel (*Lampsilis higginsi*) recovery team. The team will revise the 1978 recovery plan and help develop a multi-year study to determine the distribution, abundance, and status of this Endangered species. Impacts of the 1993 flood and the impending spread of a harmful nonnative species, the zebra mussel (*Dreissena polymorpha*), will be investigated.

*****

A public hearing on the proposed listing of the northern copperbelly water snake (*Nerodia erythrogaster neglecta*) was held April 5 in Indianapolis, Indiana. About 25 people attended. Opposition to listing was voiced by the Western Kentucky Coal Association, although its representative offered to work cooperatively with the FWS if the snake is listed. Others in attendance were concerned that snake research activities may negatively affect snake populations. Most people, however, were in favor of listing this nonvenomous snake as Threatened.

*****

The FWS Columbia, Missouri, Field Office teamed up with the Missouri Department of Conservation to monitor sites of the federally listed Missouri bladderpod (*Lesquerella filiformis*) and geocarpon (*Geocarpon minimum*) in southwestern Missouri. The team also collected tissue samples of another plant, the Ozark wake robin (*Trillium pusillum* var. *ozarkanum*), which is a candidate for listing protection. Genetic analyses will help researchers determine if it is distinct from other varieties of *T. pusillum*.

The Ozark wake robin is rare in both Missouri and Arkansas. Unfortunately, the six known sites in Missouri are not protected, and a few sites have experienced further degradation since the last time they were monitored.

*****

The City of Dayton, Ohio, is working with the FWS Reynoldsburg, Ohio, Field Office and the Ohio Division of Natural Areas and Preserves to explore protection for Ohio's second largest population of eastern prairie fringed orchids (*Platanthera leucophaea*). The orchids are growing on land owned by the City of Dayton, which plans to install water pumps that could lower the water table at the site and eliminate the orchids.

*****

FWS personnel from the FWS Twin Cities Regional Office and Green Bay, Wisconsin, Field Office attended a taxonomy and field ecology workshop hosted by the Ottawa National Forest. The central focus of the workshop was those species of *Botrychium*, or moonworts, known to occur in the Great Lakes area. Several species of these small ferns are candidates for listing under the Endangered Species Act, and more needs to be learned about their biology and ranges. This sum-

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Regional News

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mer, through funds provided to the States under Section 6 of the Endangered Species Act, the Minnesota Department of Natural Resources will invite biologists to visit several Minnesota and Wisconsin sites of *B. mormo*, a category 2 listing candidate.

*****

Region 4 - A new population of the striped newt (*Notophthalmus perstriatus*), a listing candidate, was found in Baker County, Georgia. The site is approximately 70 miles west of the nearest population in that State and about the same distance north of the nearest historical location in Florida. A 2-year survey (1991-1993) verified only three other populations of the striped newt in Georgia. University of Florida researchers report striped newts from 27 localities in Florida, all in the vicinity of Tallahassee and peninsular Florida on or near Trail Ridge.

Striped newts are restricted to dry longleaf pine forests of the southeastern coastal plain in Georgia and Florida. They share their habitat with two listing candidates, the gopher frog *(Rana areolata)* and the eastern population of the gopher tortoise *(Gopherus polyphemus)*. Little is known of the striped newt's natural history because it is secretive and unlikely to be encountered far from the small, shallow, grassy ponds in which it breeds. These ponds may have an open canopy, composed primarily of pond cypress, slash pine, and blackgum, or they may be depressions totally devoid of trees. The ponds usually fill in late autumn or early winter and dry completely by May or June. Threats to the species appear to be loss of habitat through forest conversion to agriculture and real estate development, destruction of wetland breeding sites, and intensive silvicultural practices.

*****

The FWS Asheville, North Carolina, Field Office worked with the staff of Chimney Rock Park in the mountains of western North Carolina to design a boardwalk around a poplation of rock gnome lichen *(Gymnoderma lineare)*, a plant that was proposed recently for listing as Endangered. This privately owned park, operated as a commercial recreational facility, is visited by thousands of people each year. Two Endangered species, the peregrine falcon *(Falco peregrinus)* and white irisette *(Sisyrinchium dichotomum)*, along with a candidate plant *(Monotropsis odorata)*, thrive at this site due to the protection and management provided by park personnel.

*****

Biologists from the North Carolina Arboretum and the FWS Asheville Office have collected cuttings and a seedling from the largest surviving Florida torreya (*Torreya taxifolia*) tree. This tree, planted on a North Carolina farm in the 1800's, is well outside the species' native range, which is limited to three counties in the Florida panhandle (Gadsden, Liberty, Jackson) and Decatur County, Georgia. All of these wild populations have been decimated by a fungal disease. The North Carolina tree is one of the few disease-free specimens left. Although there are no other specimens within several hundred miles, the North Carolina tree has produced fertile seeds at least once, and seedlings are now growing around it. The seedling collected from this tree has been planted in a disease-free environment on the Arboretum grounds. The cuttings will be rooted and cultivated at the Arboretum to preserve the tree's genetic material.

*****

Region 5 - In May, the National Biological Survey sponsored a 2-day workshop in Leetown, West Virginia, on the status of freshwater mussels of the Atlantic slope and Ohio-Tennessee River drainages. About 70 biologists representing State and Federal agencies (including many FWS representatives from Regions 4 and 5), conservation organizations, and the academic community participated. The informal and interactive workshop included discussion on the status, current research, threats, and conservation activities centered on freshwater mussels.

Increasing concern for the future of freshwater mussels was voiced throughout both days. Some of the main topics discussed were water quality, habitat alteration, water regulation, and the impacts of beavers on small streams containing mussels. The group also discussed the potential of newly identified threats, including use of the poison Rotenone, toxic ammonia concentrations from periodic Asiatic clam *(Corbiculata fluminea)* die-offs, impacts to host fish species from introduced fish species, and the invasion of the zebra mussel.

There was some good news. Dick Neves of the Virginia Cooperative Fish and Wildlife Research Unit presented a progress report on research the unit at Virginia Tech University is conducting. Dr. Neves is exploring the development of techniques for the creation of artificial mussel refuges (holding ponds) and propagation sites. In addition, the Leetown Science Center is offering to serve as a central repository of mussel tissues. These tissues would be available to geneticists and other researchers.

A number of biologists are investigating the breeding of freshwater mussels in laboratories. Research is focused on developing culture media that would enable glochidea (mussel larvae) to skip the host fish stage of mussel reproduction. This would possibly allow biologists to raise mussels for future reintroduction as habitat is restored.

Throughout the meeting, a watershed approach to conservation, rather

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Regional News

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than single species management, was stressed. Many participants felt that because of the successful information exchange and unexpectedly large interest, more workshops for freshwater mussels should be organized.

*****

The recovery plan for the Plymouth redbelly turtle *(Pseudemys rubriventris)* was revised recently. A limited number of copies are available from the FWS New England Field Offices at 22 Bridge Street, Concord, New Hampshire 03301 (Attn: Michael Amaral), or from the Fish and Wildlife Reference Service at 5430 Grosvenor Lane, Suite 110, Bethesda, Maryland 20814.

BOX SCORE
LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S.	ENDANGERED Foreign Only	THREATENED U.S.	THREATENED Foreign Only	LISTED SPECIES TOTAL	SPECIES WITH PLANS
Mammals	56	251	9	22	338	37
Birds	73	153	17	0	243	73
Reptiles	16	63	19	14	112	30
Amphibians	6	8	5	0	19	9
Fishes	63	11	38	0	112	63
Snails	14	1	7	0	22	27
Clams	50	2	6	0	58	40
Crustaceans	11	0	2	0	13	4
Insects	19	4	9	0	32	16
Arachnids	4	0	0	0	4	0
Plants	388	1	83	2	474	184
TOTAL	700	494	195	38	1,427*	483**

Total U.S. Endangered	700	(312 animals, 388 plants)
Total U.S. Threatened	195	(112 animals, 83 plants)
Total U.S. Listed	895	(424 animals, 471 plants)

* Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, chimpanzee, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

** There are 386 approved recovery plans. Some recovery plans cover more than one species, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of CITES Party Nations: 122

July 1, 1994

July/August 1994 **Vol. XIX No. 4**

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

September/October 1994 Vol. XIX No.5

ENDANGERED SPECIES

Technical Bulletin

U.S. Department of the Interior
Fish and Wildlife Service

Can CITES Save the Box Turtle?

by Susan Lieberman

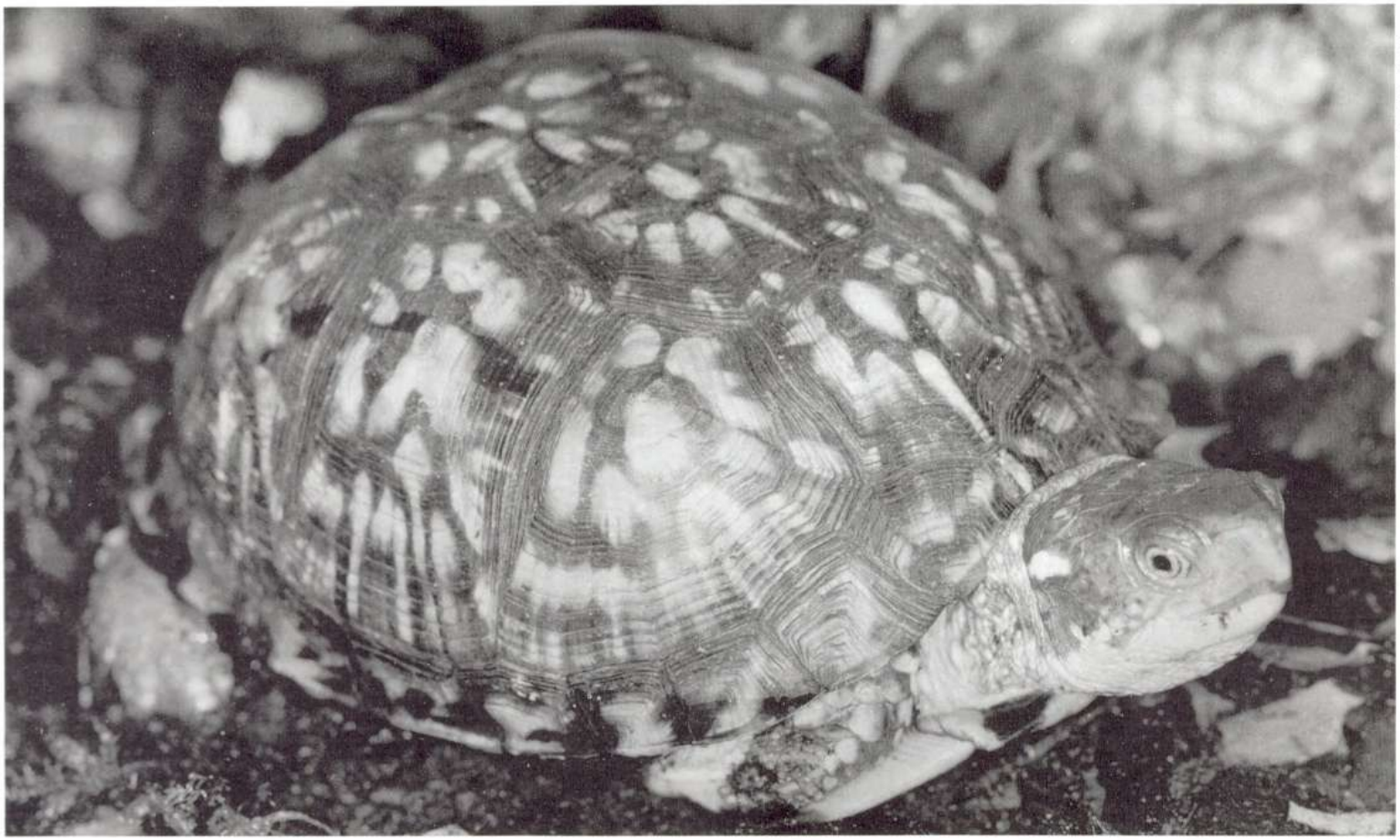

photo by Allen Salzberg

Box turtles play an important role in seed dispersal for a variety of native forest plants. In the wild, these animals can live more than 100 years, but most of those captured for the pet trade do not survive for long.

Everyone, it seems, likes turtles. Talk to people who grew up in the Northeast, South, or Midwest of the United States about box turtles, however, and they'll likely say the same thing: "Yes, they used to be common, but you don't see as many any more." Where have all the box turtles gone?

Certainly there have been significant population declines due to habitat degradation and destruction. But a more direct threat has come to light. The Fish and Wildlife Service (FWS) has learned that tens of thousands of North American box turtles (Terrapene spp.) are being taken out of the wild — and lost to the species — every year for the international pet trade.

Turtles and tortoises are highly prized by many pet keepers and hobbyists. The international demand for box turtles is always increasing, particularly in Europe, where trade in many rare tortoise species is banned by the European Community. In any pet shop in Western Europe, one is likely to see North American box turtles for sale, sometimes for up to $100 each.

Based on data gathered by the FWS Division of Law Enforcement, almost 27,000 box turtles were exported in 1992 *alone*. The 1993 records are still being compiled, but incomplete data show that more than 18,000 were exported last year. Wildlife import/export inspectors reported that 8,000-14,000 individuals of a single species, *Terrapene carolina*,

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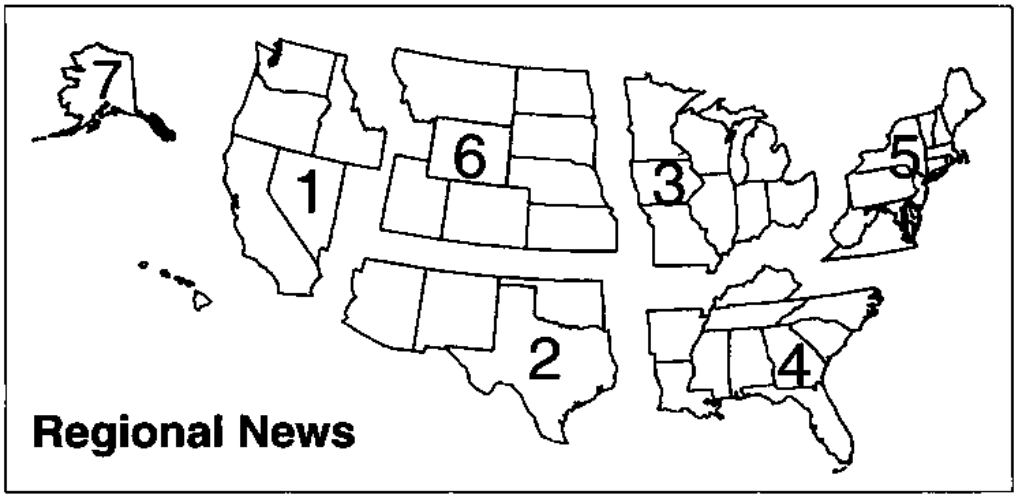

Regional News

Region 1 — Fish and Wildlife Service (FWS) biologists recently assisted Joel Satori, a National Geographic photographer working on a feature article on the Endangered Species Act. National Geographic was seeking photos of extremely rare and declining plant species. Unfortunately, it was too late in the season to photograph many of our species in bloom. The photographer was most interested in the last locality of Orcutt's spineflower *(Chorizanthe orcuttiana)*. Fewer than 50 individuals of this species (which was proposed in October 1993 for listing as Endangered) were noted last year, and it failed to germinate this year. Sites visited included Encinitas, Otay Mesa vernal pools, Torrey Pines State Park, and the Santa Ana River wash in San Bernardino. National Geographic is scheduled to publish the endangered species feature early in 1995.

*****

As detailed in *Bulletin* Vol. XIX No. 3 (1994), the Pacific pocket mouse *(Perognathus longimembris pacificus)* was emergency-listed as Endangered on February 2 because of imminent threats to the only known population. A proposal to give the animal long-term protection was published in the *Federal Register* with the emergency rule. In response, the FWS received 71 comments from the public, the majority of which supported listing the species and/or preserving its only known occupied habitat. No new detections of the Pacific pocket mouse were reported.

*****

On June 26-27, fire (reportedly started by a cigarette or fireworks) ravaged the Moapa National Wildlife Refuge in southern Nevada. The refuge was established to preserve the Moapa dace *(Moapa coriacea)*, an Endangered desert fish endemic to Nevada's Muddy (Moapa) River system. Streams on and immediately below the refuge provided the only remaining spawning habitat for this fish. Prior to the fire, the refuge supported more than 500 Moapa dace. On July 5, however, only one could be found on the refuge.

Intensive management will be needed to prevent the loss of this monotypic genus. Personnel from the Desert National Wildlife Refuge complex, FWS Reno Office, and the Reno Field

(Continued on Page 17)

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Region 2, P.O. Box 1306, Albuquerque, NM 87103 (505-766-2321); John G. Rogers, *Regional Director;* James A. Young, *Assistant Regional Director;* Susan MacMullin, *Endangered Species Specialist.*

Region 3, Federal Bldg., Fort Snelling, Twin Cities, MN 55111 (612-725-3500); Sam Marler, *Regional Director;* John Blankenship, *Assistant Regional Director;* Bob Adair, *Endangered Species Specialist.*

Region 4, 1875 Century Blvd., Suite 200, Atlanta, GA 30345 (404-679-4000); John R. Eadie, *Acting Regional Director;* Tom Olds, *Assistant Regional Director;* David Flemming, *Endangered Species Specialist.*

Region 5, 300 Westgate Center Drive, Hadley, MA 01035 (413-253-8659); Ronald E. Lambertson, *Regional Director;* Ralph Pisapia, *Assistant Regional Director;* Paul Nickerson, *Endangered Species Specialist.*

Region 6, P.O. Box 25486, Denver Federal Center; Denver, CO 80225 (303-236-7920); Ralph O. Morgenweck, *Regional Director;* Elizabeth Stevens, *Acting Assistant Regional Director;* Larry Shanks, *Endangered Species Specialist.*

Region 7, 1011 E. Tudor Rd., Anchorage, AK 99503 (907-786-3542); Dave Allen, *Acting Regional Director;* Janet Hohn, *Assistant Regional Director;* Dave McGillivary, *Endangered Species Specialist.*

U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2**: Arizona, New Mexico, Oklahoma, and Texas. **Region 3**: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4**: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the U.S. Virgin Islands. **Region 5**: Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia. **Region 6**: Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7**: Alaska.

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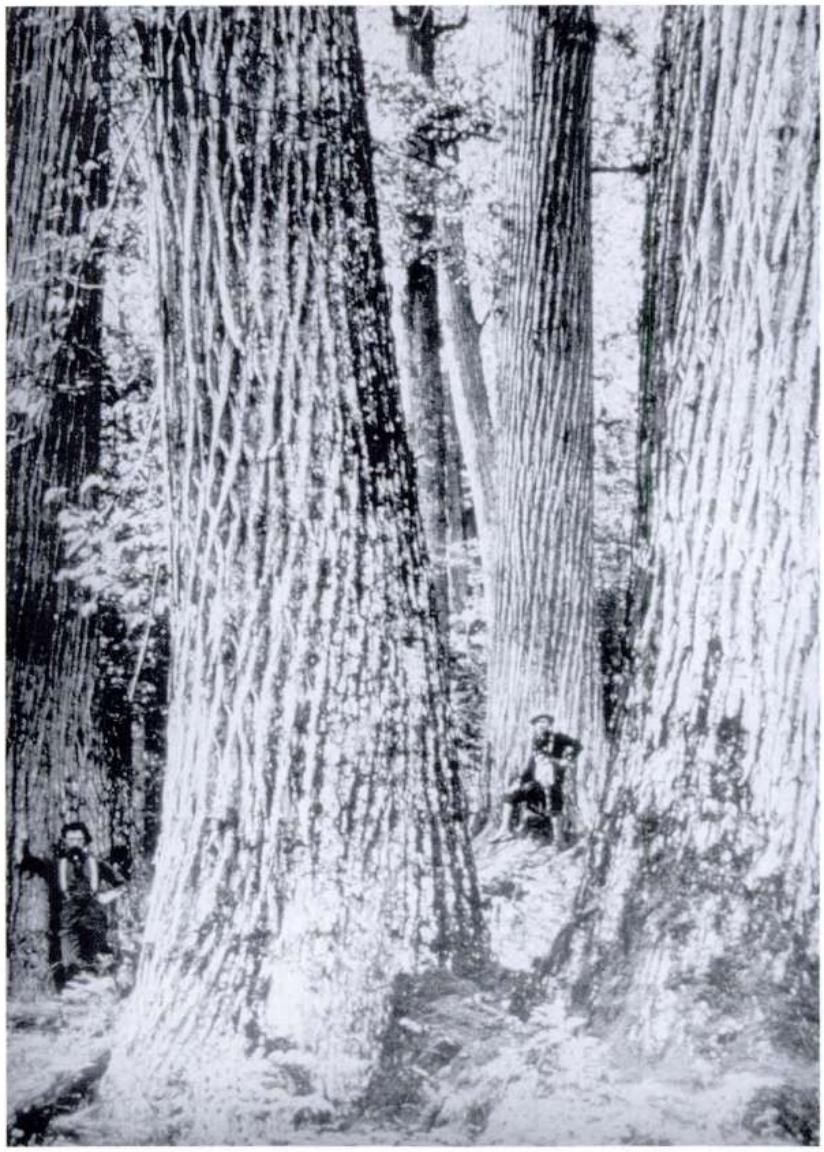
Killer Pigs, Vines, and Fungi: Alien Species Threaten Native Ecosystems

by Faith Thompson Campbell

Alien species — those introduced by human action into environments they have not reached by natural means — have transformed entire ecosystems throughout the United States. The American chestnut *(Castanea dentata)*, once one-quarter of the standing volume in the eastern deciduous forest, is now reduced to root sprouts and a few adults by the ravages of the introduced chestnut blight fungus *(Cryphonectria parasitica)*. A survey of 8 million acres (3,239,000 hectares) of southern Florida's "river of grass" — the Everglades ecosystem — by the South Florida Water Management District found 488,000 acres (198,000 hectares) to be infested with dense monocultural stands of the Australian tree, *Melaleuca quenquinervia*. *Melaleuca* stands displace the native sawgrass prairies that support the region's unique wading bird populations, and they transpire large amounts of water, thus exacerbating the increasing dryness of this marsh. In the West, the Bureau of Land Management reports that more than 10 million acres (4,049,000 hectares) of grassland in northern California has been overrun by yellow star thistle *(Centaurea solstitialis)*.



Before being attacked by a non-native fungus, the American chestnut was one of the dominant tree species in the eastern deciduous forest.

The resources of at least 96 national parks are being harmed by exotic animals, and invasive plants are damaging the resources of at least 109 parks. Alien species also threaten many national wildlife refuges. Loxahatchee National Wildife Refuge in Florida alone is contributing $75,000 a year to a joint Federal-State effort to contain the invading *Melaleuca*.

Many of our crown jewels of biological diversity are under severe threat. In the Hawaiian Islands, more than 200 birds, invertebrates, and plants are being pushed toward extinction by non-native species, including feral cats *(Felis cattus)*, rats (*Rattus* spp.), goats *(Capra hircus)* and pigs *(Sus scrofa)*; other harmful animals such as mosquitos, rats, and ants; and a variety of vines, grasses, and other alien plants. Another example is represented by the Mississippi River drainage, which is a globally important center of diversity for mollusks. Many listed mussels from that system, already threatened with extinction by habitat alteration, now face being smothered by the zebra mussel *(Dreissena polymorpha)*. This rapidly spreading pest was introduced into the Great Lakes in ship ballast water during the 1980's (see *Bulletin* Vol. XV, No. 11), and is spreading rapidly.

At least three species of plants once found on the Channel Islands off southern California already have become extinct as a result of grazing by introduced livestock, especially goats. According to the California Native Plant Society, another 30 plant species in California that are listed or proposed for listing under the Act are also threatened by alien species, often competition from non-native plants.

Among species of animals and plants listed since January 1991, alien species are considered to be a threat to 18 species found in the continental United States. The most vulnerable species are those found on islands — true islands, such as the Hawaiian Islands or the Channel Islands, or the isolated mountain peaks or bodies of water that can form "biological islands."

Not all species threatened by invading alien species are found in such obvious-

(Continued on next page)

photo courtesy of The Nature Conservancy

Hawaii is our only state with tropical rain forests, but almost half of this important resource has been destroyed, and much of what remains is threatened. Feral animals are the greatest threat to the native plants and animals of the Hawaiian forests. Feral pigs, for example, uproot native plants, promote the spread of non-native plants, cause erosion, and eat the nestlings of ground-nesting birds. Pig wallows also serve as breeding sites for introduced mosquitoes, which spread diseases to endangered Hawaiian birds.

Alien Species

(Continued from Page 3)

ly isolated habitats. Along the northern California coast, the yellow-flowered Menzies' wallflower *(Erysimum menziesii)* is losing out in competition with European beachgrass *(Ammophila arenaria)* and other alien plants. Lowered water tables, probably exacerbated by the planting of eucalyptus trees from Australia, led to rapid drying of marsh sandwort *(Arenaria paludicola)* habitat. On the banks of Peter's Creek in Virginia and North Carolina, the small-anthered bittercress *(Cardamine micranthera)* is smothered by a blanket of honeysuckle *(Lonicera japonica).* In Kentucky and Tennessee, the displacement of the herbaceous plant layer by the European garlic mustard *(Alliaria petiolata)* is a threat to a native rock cress, *Arabis perstellata*, that was proposed recently for listing as Endangered.

Even species that are endangered primarily by other causes can be put under further stress as a result of alien species. For example, the spread of *Melaleuca* throughout the Everglades, if not checked, will eliminate the habitat of the Endangered snail kite *(Rostrhamus sociabilis plumbeus)* by replacing open water and sawgrass prairies with an impenetrable tangle of tree branches.

Alien species pose a double threat to the food supply of grizzly bears *(Ursus arctos horribilis)* in Montana. The large seeds of the whitebark pine *(Pinus albicaulis)* provide about half the fat in the diet of the bear in the Yellowstone ecosystem.[1] Their nutritional importance is probably similar farther north in Glacier National Park and the Bob Marshall Wilderness, where more than 80 percent of the whitebark pine trees in some study plots are infected by an introduced disease, white pine blister rust (caused by the fungus *Cronartium ribicola).*[2] In this region, whitebark pine mortality due to blister rust exceeds 90 percent.[3]

At lower elevations, herbaceous species eaten by the grizzly and its prey[4] are beginning to be displaced by invading rangeland "noxious weeds". Knapweed (*Centaurea* spp.) already occupies thousands of acres of the Selway-Bitterroot Wilderness, and outbreaks have been found in portions of the Bob Marshall Wilderness.[5] Research has shown that once several small populations are established, invasive plants can explode across the landscape.[6]

As the Congressional Office of Technology Assessment said in its 1993 report, *Harmful Non-Indigenous Species in the United States,* the Federal government's efforts to prevent introductions of additional alien species or to contain the damage of those already here is "a largely uncoordinated patchwork of laws, regulations, policies, and programs." Funding is another factor. The National Park Service has identified control or mitigation projects costing a total of $61.25 million, but only $11.07 million has been budgeted over four fiscal years to carry out the projects. In Congress, strengthening amendments to the Lacey Act and Federal Noxious Weed Act are being considered, but no bills have been introduced.

Most readers are probably familiar with the story of the chestnut blight and Dutch elm disease. Fewer know about the balsam and hemlock woolly adelgids, butternut canker, and Port-Orford-cedar root disease.[7] Interestingly, none of the trees struck by these introduced pests have been listed under the Endangered Species Act, despite 75 percent mortality for the American elm *(Ulmus americana)* and nearly 100 percent mortality for mature chestnuts. Two besieged tree species, the butternut *(Juglans cinera)* and the Fraser fir *(Abies fraseri)*, are candidates for listing. A recent petition to list the whitebark pine has been denied because the species is still healthy in much of its widespread range, and the Act does not allow listing of plants by populations.

Some species, such as the chestnut and Fraser fir, have so far persisted as root sprouts or seedlings, although most of the full-grown specimens have died. It has not been tested whether such species meet the definitions of "Endangered" or "Threatened" in the Act. Is it legally acceptable that trees persist as immature shadows of the historical giants? In any case, time appears to be running out for the elm, chestnut, and butternut. A more virulent form of elm blight and the inevitable death of the chestnut root crowns are pushing these species closer to oblivion. Butternuts do not resprout once the fungus *(Sirococcus*

(Continued on next page)

Alien Species

(Continued from previous page)

clavigignenti-juglandacearum) has killed the crown and trunk.

Species dependent on forest habitat are threatened indirectly by the damage caused by introduced pests. As reported in *Bulletin* Vol. XIX, No. 2 (March/April 1994), the spruce fir moss spider *(Microhexura montivaga)* and rock gnome lichen *(Gymnoderma lineare)* were proposed for listing as Endangered because of the decline of Fraser fir *(Abies fraseri)* and red spruce *(Picea rubens)* forests that once cloaked peaks of the southern Appalachians. The loss of tree canopy has exposed the formerly wet habitats needed by the spider and lichen to the drying effects of the sun. A major factor in the the decline of the fraser fir is believed to be an alien insect, the balsam woolly adelgid (*Adelges piceae).*

Further information about the threats posed to ecosystems and individual species by invasive alien species is available from the following sources:

United States Congress. Office of Technology Assessment. 1993. *Harmful Non-Indigenous Species in the United States*. Executive Summary (57 pages) available from OTA at 202-224-8996; order the full report (391 pages) from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 371954, Pittsburg, PA 1520-7954; 202-783-3238. GPO number 052-003-01347-9; $21.

McKnight, Bill N. Editor. 1993. *Biological Pollution.* Bill N. McKnight, IAS Publications, 1102 North Butler Avenue, Indianapolis, IN 46219; 317-352-1970. $26.50.

Grazing Lands Forum. 1994. *An Explosion in Slow Motion: Noxious Weeds and Invasive Plants on Grazing Lands.* Dan Undersander, American Society of Agronomy, 1575 Linden Drive, 353 Moore Hall, Madison, WI 53706-1597; $2.

Campbell, F.T. and S.E. Schlarbaum. 1994. *Fading Forests: North American Trees and the Threat of Exotic Pests.* Natural Resources Defense Council, 40 West 20th Street, New York, New York 10011; 212-727-2700. $8.95.

References:

[1]Schmidt, W.C. 1992. Effect of White Pine Blister Rust on Western Wilderness. American Forestry: An Evolving Tradition. Society of American Foresters National Convention, Richmond, VA. October 1992.

[2]Keane, R.F. and S.F. Arno. 1993. Rapid Decline of Whitebark Pine in Western Montana: Evidence from 20-Year Measurements. Western Journal of Forestry, Vol. 8, No. 2, April 1993; Schmidt.

[3]Kendall, K.C. and S.F. Arno. 1990. Whitebark Pine — An Important But Endangered Wildlife Resource. Presented at the Symposium on Whitebark Pine Ecosystems: Ecology and Management of a High-Mountain Resource. Bozeman, MT. March 1989.

[4]Kummerow, M. 1992. Weeds in Wilderness: A Threat to Biodiversity. Western Wildlands. Summer 1992; Bedunah, D.J. 1992. The Complex Ecology of Weeds, Grazing and Wildlife. Western Wildlands. Summer 1992.

[5]Kummerow.

[6]Kummerow; Mack; Hobbs, R.J. and S.E. Humphries. The Ecology and Management of Plant Invasions: An Integrated Approach. Submitted to Conservation Biology, 1994.

[7]see Campbell, F.T. and S.E. Schlarbaum. 1994. Fading Forests: North American Trees and the Threat of Exotic Pests. Washington, D.C. Natural Resources Defense Council. 1994.

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The opinions expressed by Dr. Campbell are not necessarily those of the Fish and Wildlife Service. Her article is part of an effort by the Bulletin to explore some of today's more challenging wildlife conservation issues by soliciting material representing independent viewpoints. If you would like to contribute by proposing an article, write the Editor, Endangered Species Technical Bulletin, 310 ARLSQ, Washington, D.C. 20240, or call 703/358-2390.

Final Listing Rules

Final rules extending Endangered Species Act protection to five species — four plants and one fish — were published in June and July of 1994:

Three Hawaiian Plants

Three species of plants native to the Wai'anae Mountains on the island of O'ahu were listed June 27 as Endangered:

- ***Gouania vitifolia*** - a climbing shrub or woody vine in the buckthorn family (Rhamnaceae);
- ***Diellia unisora*** - a fern in the family Polypodiaceae; and
- ***Cyanea grimesiana ssp. obatae*** - a shrub in the bellflower family (Campanulaceae).

All three plants have declined in range and numbers due to urbanization, habitat degradation and possible predation by non-native feral animals, and heavy competition from introduced plant species for living space, light, water, and nutrients.

Water Howellia *(Howellia aquatilis)*

A small aquatic plant in the bellflower family, the water howellia historically grew in ephemeral wetlands over much of the Pacific northwest. Activities that alter the hydrology of these wetlands, such as timber harvest, livestock grazing, and urbanization, have eliminated the water howellia from most of its former habitat. The species' known range has been reduced to scattered sites in Washington, Idaho, and Washington totalling less than 150 acres (60 hectares). Because of continuing threats, the water howellia was listed July 14 as Endangered.

Rio Grande Silvery Minnow *(Hybognathus amarus)*

This species was once one of the most widespread and abundant fishes in the Rio Grande, occurring from northern New Mexico to the Gulf of Mexico. It was also found in much of the Pecos River, a major Rio Grande tributary in New Mexico and Texas. But water removal, channelization, regulation of natural river flows for irrigation purposes, water pollution, and competition or predation from non-native introduced fish species have reduced the Rio Grande silvery minnow to about five percent of its former range. It now survives only in a 170-mile (275 kilometer) reach of the middle Rio Grande in New Mexico. The vulnerability of the remaining habitat led to the listing of the Rio Grande silvery minnow on July 20 as Endangered.

Jaguars in the United States

by Ron Nowak

The jaguar often is not considered native to this country, yet much of the southern United States is well within its historical range. Intriguing reports of jaguar sightings in the southwest are still received periodically. A 1986 jaguar kill in southeastern Arizona added to the interest in extending Endangered Species Act protection to any of these animals that might remain or someday recolonize former habitat in the U.S.

Investigations into the 1986 jaguar kill continued until March 1993, when a taxidermist's mount of the cat was sold in New Mexico. As a result, two men have been charged with felony violations of the Lacey Act. This Federal law prohibits interstate commerce in wildife protected by State law. Evidence gathered for the case verified that the jaguar was killed in the Dos Cabezas Mountains of Cochise County, Arizona, and that it was not a released captive. The case is being based on the Lacey Act violation because the jaguar does not yet have Endangered Species Act protection in the U.S.

Since the 1986 incident, several other accounts of jaguars in Arizona have been received, including two sightings in Pima County. One observation took place in 1988, and another was reported in December 1993 from the Buenos Aires National Wildlife Refuge. Much suitable habitat remains in the region.

Although the jaguar does seem to have become a rare border animal by the 1970's, such was not always the case. Fossil evidence shows that at the end of the Ice Age, about 10,000 years ago, the species occurred throughout the southern half of the conterminous U.S. and was especially abundant in Florida. The writings of several early naturalists (including Audubon) and the discovery of certain Indian artifacts indicate that the jaguar still occupied part of the southeastern U.S. as late as the 19th century. In 1886, there was a newspaper report of a jaguar being killed near New Orleans. The species also seems to have been well known in southern California in early historical times, though the last jaguar reported in that State was killed near Palm Springs in 1860.

photo by Denver Bryan

By the time scientific surveys began in the late 1800's, the U.S. range of the jaguar was restricted to Arizona, New Mexico, and Texas. In this region, the animal was not then especially rare. Substantial breeding populations could still be found in Arizona as far north as the Grand Canyon, and in Texas to the south and east of San Antonio. By this period, however, the southwest was undergoing rapid settlement, sheep and cattle were being established in great numbers, natural habitat and prey species were disappearing, and the jaguar was being intensively hunted as a predator of livestock.

Shortly after the turn of the century, the jaguar seems to have been extirpated in New Mexico and Texas, except as an occasional wanderer. Nonetheless, a recent assessment of records by David E. Brown, a field biologist and author of several books on southwestern wildlife, suggests that a resident breeding population survived in Arizona at least through the 1950's. He calculated that a minimum of 64 jaguars have been taken in the State since 1900. Prior to the 1986 incident, the last known kill of a naturally occurring jaguar in the U.S. happened near Nogales, Santa Cruz County, Arizona in 1971.

According to Brown, jaguars also were taken in the northern Mexico state of Sonora, near the U.S. border through the 1960's. The species still is present in the Sierra Bacate near Guyamas, Sonora, about 200 miles (320 kilometers) south of Arizona, and that area may be the source of the individuals that cross into Arizona. However, destruction of natural forest cover is rampant in northern Mexico, and there is doubt as to how long a viable jaguar population can survive in the face of increasing agricultural activity and human accessibility. In contrast, environmental conditions seem to have improved on the U.S. side of the border. Numbers of deer and javelina, prime jaguar prey, are at high levels, and there are still enough large tracts of brush and canyon woodland to provide cover for a few of the cats. Brown has suggested that the species could be restored in parts of the Coronado National Forest in southeastern Arizona.

Dr. Nowak is a mammalogist with the FWS Office of CITES Scientific Authority.

Listing Proposals — June/July 1994

Eight species — seven animals and one plant — were proposed by the Fish and Wildlife Service (FWS) during June and July 1994 for listing as Endangered or Threatened. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Jaguar (Panthera onca)

Jaguars, the largest cats native to the Western Hemisphere, historically occurred from northern Argentina through Central America and Mexico into the southern United States. Within the U.S., they have been recorded most commonly in Arizona, but there are also records from California, New Mexico, Texas, and Lousiania. Currently, no known breeding populations remain in this country, although occasional reports of individual jaguars in Arizona persist. David Brown, an Arizona field biologist, has calculated that at least 64 jaguars have been taken in Arizona since 1900. (See accompanying article.) Breeding populations still exist in parts of northern Mexico.

After commercial fur hunting and predator control led to the decline of the species over most of its range, the jaguar was listed under the Act in 1972 as Endangered. Due to an oversight, the listing rule applied only to other countries, and did not give protection to any jaguars that may remain in — or in the future enter — the U.S. On July 13, 1994, the FWS proposed to correct this oversight by extending the Endangered classification to jaguars throughout their historical range, including California, Arizona, New Mexico, Texas, and Louisiana.

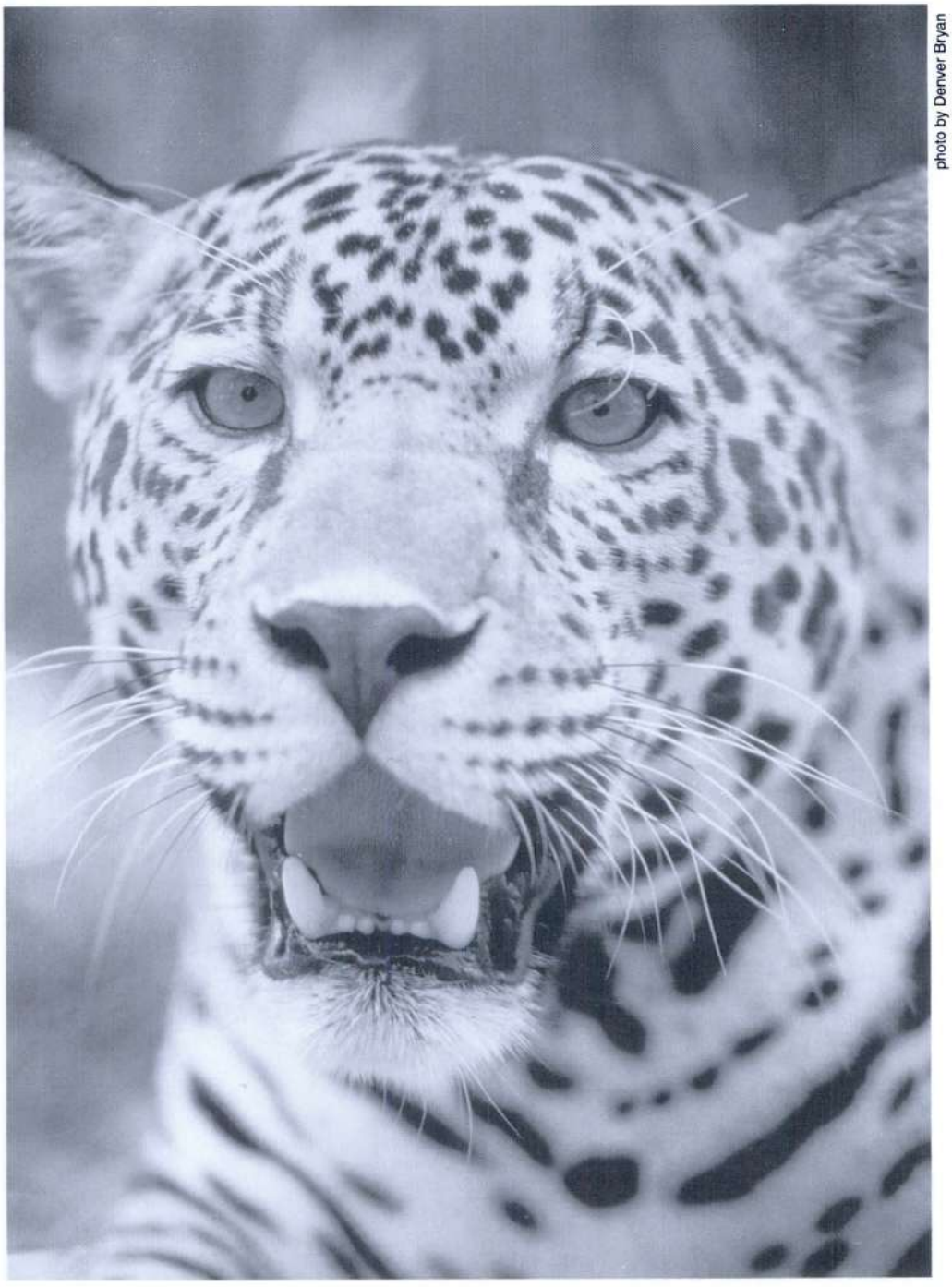

photo by Denver Bryan

Jaguars historically inhabited parts of the southern United States, and sightings continue to be received from Arizona.

Five Freshwater Mussels

The Ohio River drainage, which includes the Tennessee and Cumberland Rivers, is a center for freshwater mussel evolution and historically contained about 127 distinct mussel species and subspecies. In less than 100 years, however, 44 percent of this once rich mussel fauna has disappeared or drastically declined as its habitat was dammed, dredged, and polluted. Eleven species are now extinct, 28 are classified as Endangered or Threatened, and 18 others (including the following five species) are listing candidates. No other wide-ranging faunal group in the continental U.S. has experienced this degree of loss in so short a period of time.

On July 14, the FWS proposed to add another five taxa from the Cumberland and Tennessee River systems to the growing list of Endangered freshwater mussels in the southeast:

- **Cumberland elktoe** ***(Alasmidonta atropurpurea)*** - a species with a smooth, somewhat shiny shell covered with green rays;
- **oystershell mussel** ***(Epioblasma capsaeformis)*** - characterized by a yellowish to green shell with narrow, dark green rays;
- **Cumberlandian combshell** ***(Epioblasma brevidens)*** - a mussel with a thick, solid, yellow to tawny-brown shell marked by green, broken rays;

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Listing Proposals

(Continued from Page 7)

• **purple bean** ***(Villosa perpurpurea)*** - usually dark brown to black in outer shell color with numerous fine, closely-spaced rays; and

• **rough rabbitsfoot** ***(Quadrula cylindrica strigillata)*** - a subspecies distinguished by an elongated, heavy, rough textured shell that is yellowish to greenish in color and marked with green rays, blotches, and chevron patterns.

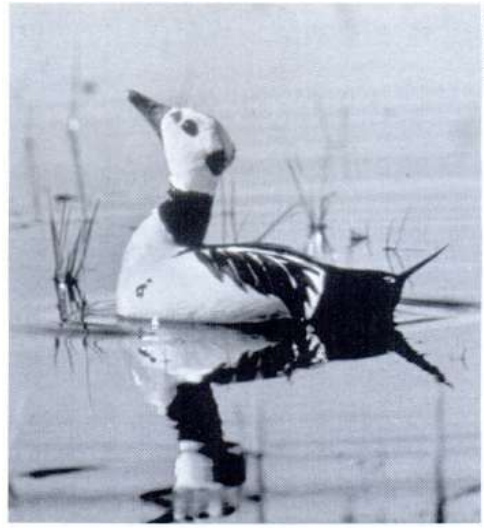
The Cumberland elktoe survives in short sections of the Cumberland River system in Kentucky and Tennessee. Oystershell mussels and Cumberlandian combshells occur at extremely low numbers in portions of the Cumberland and Tennessee River basins in Kentucky, Tennessee, and Virginia. The purple bean and rough rabbitsfoot are still found in a few sections of the upper Tennessee River system in Tennessee and Virginia.

All five taxa have been reduced significantly in range and now exist only as small, isolated populations. Much of their former free-flowing stream habitat has been inundated by impoundments. Continuing threats are posed by water quality degradation, primarily from agricultural, urban, and coal mining runoff.

Steller's Eider *(Polysticta stelleri)*

The smallest of four eider species, the Steller's eider breeds in coastal areas of arctic Alaska and Russia. A few hundred thousand Steller's eiders are believed to exist worldwide, but the species has disappeared from most of its breeding range in Alaska in recent years.

The current breeding range of the Steller's eider in Alaska includes the arctic coastal plain. In Russia, the species breeds along the arctic coast from the Chukotski Peninsula west to the Kheta River, and along the western Siberian coast (including the Taimyr, Gaydan, and Yamal Peninsulas). Steller's eiders nest on tundra near ponds and lakes, where they feed on insects, plants, and crustaceans. During winter, they move into marine areas, diving and dabbling in shallow water to feed on mollusks and crustaceans. Only a small portion of the world's Steller's eiders nest in North America, but most that breed in Asia move into the near-shore marine waters of southwestern Alaska to winter.



FWS photo

The Steller's eider has disappeared from most of its Alaskan breeding grounds in recent years.

Steller's eiders formerly nested in Alaska in the eastern Aleutian Islands, coastal areas of the Alaska Peninsula, the Yukon-Kuskokwim Delta, and along the northern coast east to the Canadian border. In recent decades, however, the species has disappeared as a breeder from all areas in Alaska except the western arctic coastal plain (although the first nest found in many years on the Yukon-Kuskokwim Delta was located this year). Steller's eiders occur at low densities in this vast, remote region, and biologists are uncertain as to how many currently nest there.

Counts of Steller's eiders wintering in Alaska suggest that the worldwide population may have declined by as much as 50 percent, although wintering population estimates are imprecise. To date, biologists have not identified the factor or factors causing the species' decline. However, other marine organisms in Alaska have declined in recent years as well. The spectacled eider *(Somateria fischeri)* and Steller sea lion *(Eumetopias jubatus)* are both currently listed as Threatened species, and declines have been noted in populations of red-legged kittiwakes *(Rissa brevirostris)*. Because the factors causing Steller's eider numbers to decline remain unknown, further research will be required before conservation measures for the species can be formulated.

The FWS proposed July 14 to list the Alaska breeding population of this bird as Threatened. Researchers hope to determine soon if the problems facing the Alaska breeding population also threaten the worldwide population of Steller's eiders.

(Information for this account was provided by Ted Swen, a biologist in the FWS Fairbanks, Alaska, Ecological Services Office.)

Delissea undulata

This Hawaiian plant, which has no common name, is a palm-like tree in the bellflower family (Campanulaceae) that grows to about 30 feet (10 meters) tall. Its leaves are long and narrow, with undulating margins, and the flowering stalk bears 5 to 20 greenish-white, slightly downcurved flowers. Historically, *D. undulata* grew on the islands of Ni'ihau, Kau'i, Maui, and Hawai'i, but now only a single plant remains.

The unique native flora of the Hawaiian Islands has declined tremendously since the archipelago was settled. Like the other 164 Hawaiian plants already listed as Threatened or Endangered (as of August 31, 1994), *D. undulata* was reduced in range and numbers because of urbanization, ranching and agricultural development, and the introduction (accidental as well as intentional) of non-native animals and plants. Predation and/or habitat degradation by feral cattle, pigs, and goats are responsible for much of the decline, as is competition from alien plants for space, water, light, and nutrients. *Delissea undulata* was feared to be extinct until a single plant was found in 1992 on the island of Hawai'i.

New Poster Features Oklahoma's Endangered Species

by Erich Langer

Endangered species education outreach received a big boost recently with the unveiling of a new full-color poster, *Oklahoma's Threatened and Endangered Species.* Working with several partners, the Fish and Wildlife Service's Oklahoma Field Office produced 30,000 of the posters for distribution to schools, libraries, and educators.

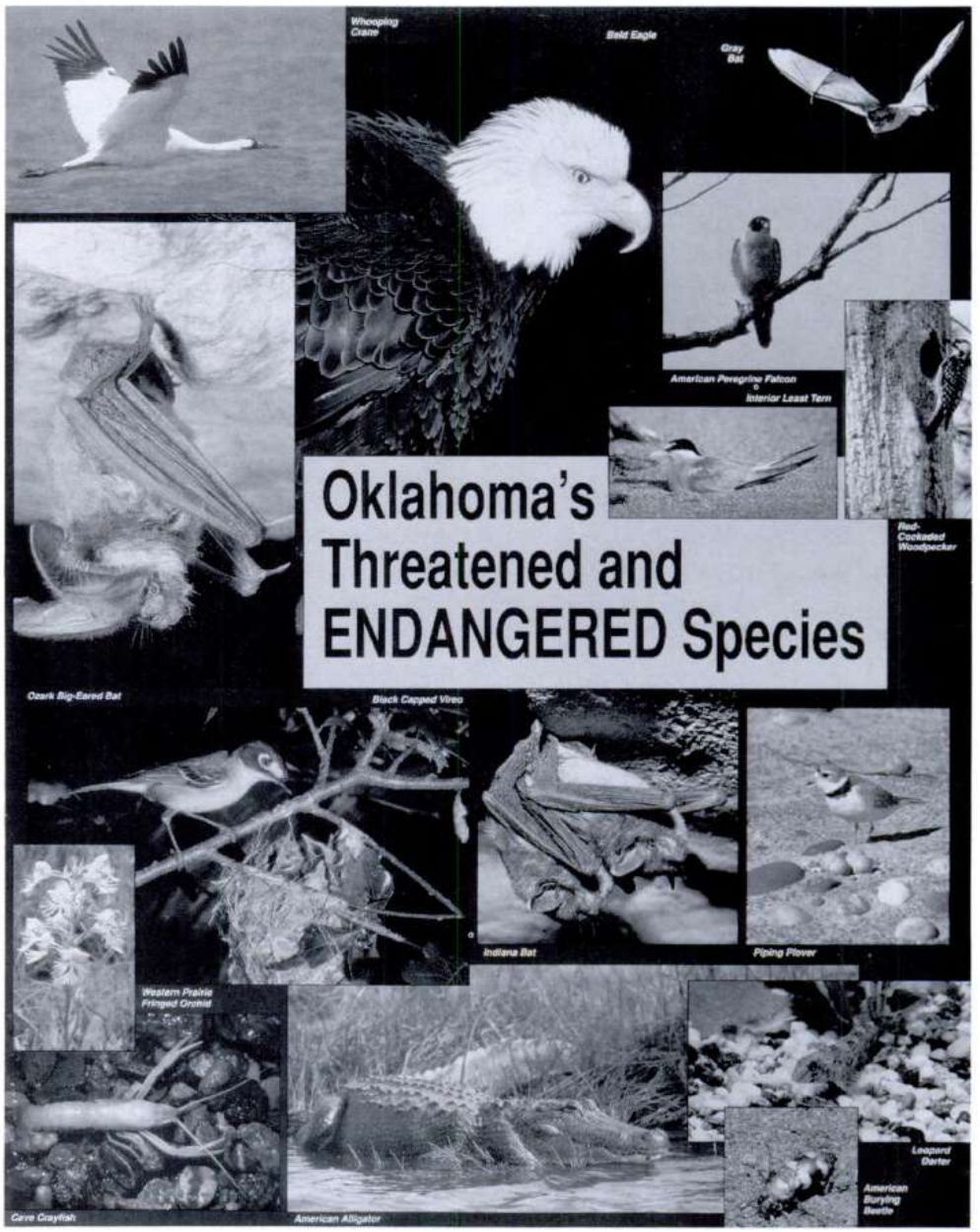
The colorful poster shows most of Oklahoma's 22 federally-listed species, including the whooping crane *(Grus americana),* bald eagle *(Haliaeetus leucocephalus*), American peregrine falcon *(Falco peregrinus anatum),* red-cockaded woodpecker *(Picoides borealis),* black-capped vireo *(Vireo atricapillus),* interior least tern *(Sterna antillarum),* piping plover *(Charadrius melodus),* gray bat *(Myotis grisescens),* Ozark big-eared bat (*Plecotus townsendii ingens),* Indiana bat *(Myotis sodalis),* cave crayfish *(Cambarus zophonastes),* leopard darter *(Percina pantherina),* American burying beetle *(Nicrophorus americanus),* and western prairie fringed orchid *(Platanthera praeclara).*

The poster puts a strong emphasis on providing important biological information. On the back of the poster, the authors provide natural history information for all listed species, including their current status, description, range, diet, reason(s) for decline, and other notes of interest.

Educators will find the poster is an excellent tool for stimulating discussion about how habitat loss, pesticide poisoning, and certain land use practices have put these species in danger of extinction. "We wanted to provide Oklahomans with an informative, educational, and visually pleasing product that would help teach folks about our State's threatened and endangered species," said FWS Assistant Field Supervisor Charlie Scott. "By teaming up with wildlife and education specialists with the Oklahoma Department of Wildlife Conservation, Oklahoma Chapter of The Nature Conservancy, Oklahoma State University Extension Service, and Army Corps of Engineers, we were able to develop an excellent poster for a little over 20 cents each."

The posters are being distributed free to schools, libraries, and teachers. They are also available to Federal, State and local agency offices. For a copy, contact the U.S. Fish and Wildlife Service, Oklahoma Field Office, 222 South Houston, Suite A, Tulsa, Oklahoma 74127; telephone 918/581-7458.

Erich Langer is a public outreach specialist with the FWS Oklahoma Field Office.



Sea Turtle Survey: Cooperative Effort in the Mansfield Channel

by Donna J. Shaver

According to numerous historical accounts, large numbers of green turtles *(Chelonia mydas)* once occupied Texas inshore waters (bays, estuaries, and passes). In the mid-1800's, these waters were the site of a green turtle fishery. During peak years of operation, more than 500,000 pounds (230,000 kilograms) of sea turtles were taken from the area each year. Over-harvesting and severe freezes in the late-1800's apparently decimated the area's green turtle population. Today, all five sea turtle species occurring in Texas waters — the green, Kemp's ridley *(Lepidochelys kempii)*, loggerhead *(Caretta caretta)*, hawksbill *(Eretmochelys imbricata)*, and leatherback *(Dermochelys coriacea)* turtles — are federally listed as either Threatened or Endangered. Current human-related threats to sea turtles in this area include take incidental to dredging, boating, and fishing activities.

In June 1989, the Padre Island National Seashore initiated the first systematic field survey of sea turtles in Texas inshore waters. Funding has been provided by the U.S. Fish and Wildlife Service (FWS), National Park Service, Southwestern Parks and Monuments Association, and National Biological Survey. These agencies hope the survey will aid in development of protective measures for sea turtles present in the Mansfield Channel, which is located at the southern end of Padre Island National Seashore. This channel is one of only two direct passages that connect the Laguna Madre and the Gulf of Mexico.

One day per month since June 1989, researchers have placed a 100 yard (91 meter) long tangle net at the mouth of the Mansfield Channel to capture turtles for tagging and temporary study. Data on species composition, seasonality, residency, temporal patters, size classes, growth, and several other topics have been collected. Blood samples have been removed from many of the turtles to determine gender and breeding colony of origin.

During 565 hours of netting from June 1989 through December 1993, 56 green turtles were caught, some more than once, and one hawksbill turtle was captured once. The estimated capture rate calculated for this study was similar to those recorded during previous netting studies conducted in Florida waters identified as green turtle developmental habitat (Guseman and Ehrhart 1990). All of the green and hawksbill turtles captured in Texas were juveniles. Twenty-four of the 56 green turtles (43 percent) were caught more than once, and the mean interval from the first to the last capture of these 24 individuals was 5 months. Green turtles were caught during all months of the year except January, and no turtles were caught when the average daily water temperature was below 59.5°F (15.5°C).

No Kemp's ridley sea turtles were netted in the Mansfield Channel, but a copulating pair of this critically endangered species was sighted 6.1 miles (9.8 km) west of the netting location in June 1991 (Shaver 1992). This siting was the first documented observation of mating Kemp's ridleys in Texas waters, and one of only a few records of this species in the Laguna Madre and the two connecting passageways to the Gulf of Mexico.

The data gathered during this study reveal the importance of the Mansfield Channel as habitat for green turtles along the Texas coast. Transient and seasonally resident green turtles apparently use the Mansfield Channel for foraging and resting habitat during the spring, summer, and fall months, but leave the area during winter in favor of deeper, warmer waters. Green turtles may stop at the Mansfield Channel before they pass through to access feeding areas, after they exit inshore feeding areas, or prior to continuing their travels in offshore waters. Based on high recapture rates, it appears that many of the turtles that arrive at the Mansfield Channel in spring and summer become residents for a few months. These individuals may use the area as an intermediate developmental habitat between their pelagic and lagoonal stages.

In 1992, the National Park Service and National Marine Fisheries Service used data from the survey to formulate recommendations for minimizing sea turtle take during dredging in the Mansfield Channel. The information is also being used by the FWS during development and implementation of sea turtle recovery plans. Information from this study should continue to help guide management decisions affecting protection of sea turtles in Texas inshore waters.

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Donna Shaver is a Research Biologist with the National Biological Survey at the Southern Science Center on Padre Island National Seashore.

Habitat Model Identifies Potential Orchid Sites

by Molly Sperduto

The small whorled pogonia *(Isotria medeoloides)* is the rarest orchid in eastern North America, north of Florida. This small, green orchid has a wide distribution, and appears to grow in mixed deciduous, secondary woods, which are fairly common throughout the eastern United States. Finding the small whorled pogonia is difficult in large areas of habitat or in dense understory. But a new computerized model using a geographical information system (GIS) is helping botanists narrow the search for undiscovered populations of this rare orchid.

A GIS incorporating remotely sensed and other data was used to determine 1) whether small whorled pogonia populations in New Hampshire and Maine prefer particular site conditions and 2) if combinations of these conditions could be used to identify potential habitat. In 1993, the model assisted biologists in locating nine previously undiscovered populations of small whorled pogonia, and helped lead to the Fish and Wildlife Service's proposal to reclassify the species from Endangered to Threatened.

To develop this model, the locations of 26 small whorled pogonia sites were digitized, and general habitat characteristics at each site were identified. Among the habitat features analyzed were topography (using U.S. Geological Survey data), soil types (as characterized by the U.S. Department of Agriculture's Soil Conservation Service), and forest reflectance (from LANDSAT satellite imagery). The importance of each habitat characteristic was evaluated with a chi-square test of habitat features at sites with and without small whorled pogonias.

The following general characteristics were associated with small whorled pogonia sites and assigned the highest weights: soils with a pan layer, slopes between 11 and 17 percent, and a specific degree of canopy reflectance in the near infra-red wavelengths that is related to species composition and the amount of canopy closure. Field surveys to each of the 26 small whorled pogonia sites corroborated the general habitat findings. In addition, these surveys provided researchers with information concerning the herbaceous species, micro-topography, and light levels at the sites.

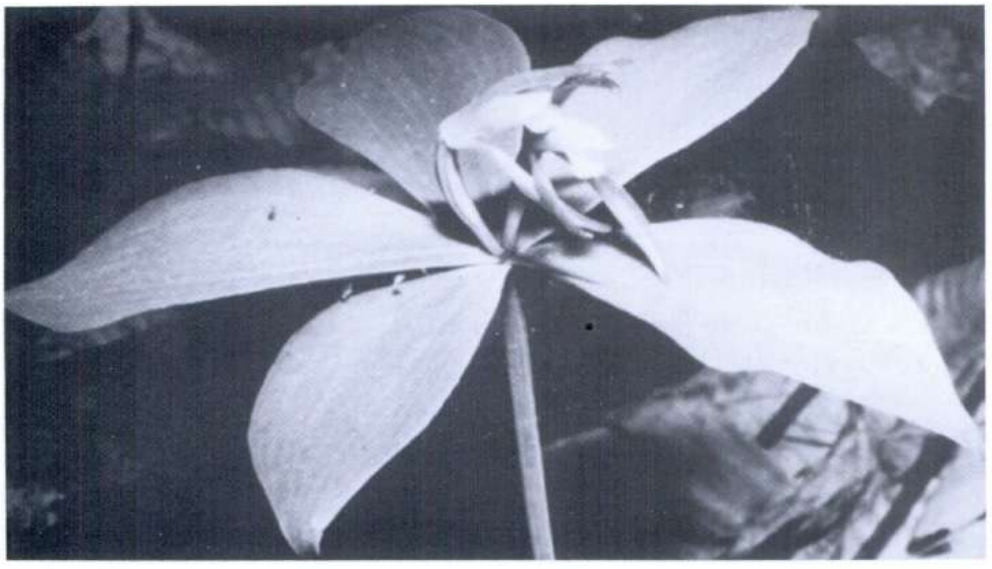

photo by Irene Stuckey

small whorled pogonia

The GIS assisted researchers in locating each of three general habitat features — soils, slopes, and forest reflectance — on five pilot USGS topographic quadrangles in New Hampshire and one town in Maine. Potential habitat was ranked according to the sum of the weights received for each habitat feature at each location. Locations containing each of the important habitat features received the highest rank.

Researchers surveyed approximately 90 of the highest ranked potential small whorled pogonia sites during the 1993 field season. Previously unknown populations were discovered at 10 percent of the predicted sites. In one representative quadrangle, the GIS model was able to determine that 94 percent of the total acreage was unsuitable for small whorled pogonias. It identified the six percent that contained the best potential habitat, allowing biologists to focus their surveys on the most promising sites. In another test of the model, it was applied to 23 known sites and correctly predicted 78 percent of them as potential habitat.

The small whorled pogonia habitat model continues to be used in the New England region. The Vermont and New Hampshire Natural Heritage Programs plan to survey potential habitat identified by the model, and the U.S. Forest Service is funding a thorough search for small whorled pogonias in the White Mountain National Forest. Use of the model to locate potential habitat may streamline informal interagency consultations carried out under Section 7 of the Endangered Species Act for Forest Service activities in the pogonia's range.

Molly Sperduto is a biologist with the Fish and Wildlife Service's New England Field Office in Concord, New Hampshire. She developed the small whorled pogonia habitat model while working for the Service as a graduate co-op student.

Recovery Updates

The recovery of imperiled plants and animals to a secure status in the wild is the ultimate goal of the Fish and Wildlife Service's endangered species program. In recognition of the growing interest in species recovery, we have created a new *Recovery Updates* section. The recovery news is arranged by region, and we encourage all offices to bring their success stories to light.

Region 1

• **least Bell's vireo** ***(Vireo bellii pusillus)*** - Numerous detections of this Endangered bird throughout southern California in the spring and early summer of 1994 suggest that it is expanding its range and may be on the road to recovery. Management of the largest vireo populations is responsible for significant population increases and has contributed to recolonization of areas that had not previously accommodated vireos. Vireos that were color-marked by managers in San Diego County continue to appear and breed in areas 80 miles or more to the north in Riverside and Orange Counties.

In the Prado Basin (Riverside County), at least 150 vireo pairs have been detected thus far in 1994 in an area where 19 pairs were detected in 1986. Preliminary data suggest that at least two large populations elsewhere have similarly increased in size. It has become clear that management of the vireo (including habitat preservation/restoration and cowbird abatement) is also benefitting other bird species, including yellow warblers *(Dendroica petechia)* and southwestern willow flycatchers *(Empidonax trailii extimus).*

Region 2

• **white bladderpod** ***(Lesquerella pallida)*** - This spring, two new populations of this Endangered plant, which is endemic to Texas and is now limited to one county, were discovered through efforts supported by the FWS Clear Lake, Texas, Field Office. All other known historic locations were visited to determine if the species is still present. Specimens were found at all sites, but in limited numbers in most locations due to invasions of exotic plants. Species experts were consulted to determine management needs, and landowners of most of the known sites have been contacted regarding the potential for management work on their land.

photo by Jeanne Tinsman

immature California condor

The FWS Clear Lake, Texas, Field Office has also initiated an experimental effort to encourage community protection of the white bladderpod in exchange for the potential to promote ecotourism. City and county officials and local schools were contacted and informed of the species' presence in their area. The uniqueness of the species was emphasized; it is limited to exposed outcrops of a specific geologic formation, forming alkaline island habitats within the normally acidic Texas pineywoods. In addition, the white bladderpod may be of significant economic importance. High-quality industrial oils have been extracted from the seeds of *Lesquerella* species, and a natural gum found in them is currently being investigated for potential use in food products.

• **California condor** ***(Gymnogyps californianus)*** - The FWS Region 2 Office hired a biologist in November 1993 to begin investigating the potential for releasing condors in Arizona and New Mexico. Establishing additional, disjunct populations in historically occupied areas is a high priority for the recovery team. The FWS has identified two potential areas in Region 2 for condor reintroductions. The Grand Canyon/Vermilion Cliffs region in northern Arizona is a remote area characterized by broad plateaus and deep canyons. Most of the land is in Federal or Native American ownership. Condors were observed in the Grand Canyon and other parts of Arizona as late as the turn of the century. Although no modern records exist for condor sightings in New Mexico, there is suitable habitat in the eastern foothills of the Gila National Forest. FWS officials are

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Recovery Updates

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investigating the 300,000-acre Ladder Ranch as a potential condor release area.

Because of the large number of land management agencies and potentially affected groups, particularly in the Grand Canyon/Vermilion Cliffs area, the FWS is holding a series of informational meetings for agencies and the general public. Recovery team members have played an important role in these early efforts by giving presentations on the status of the program and establishing a rationale for additional condor populations. The meetings have also provided an opportunity for meeting participants to provide input directly to the recovery team. The FWS is also cooperating with Federal and State agencies in data collection and preparation of an environmental assessment of the proposed condor release areas.

• **Lee pincushion cactus (*Coryphantha sneedi leei)* -** A new population of this Threatened plant was found recently in Carlsbad Caverns National Park. The discovery was made during planning efforts for a prescribed burn.

Region 3

• **decurrent false aster *(Boltonia decurrens)* -** Staff from the Mark Twain National Wildlife Refuge in Illinois discovered hundreds of seedlings of this Threatened plant species on a site affected by the 1993 flood. The staff, along with a professor from Southern Illinois University who has an FWS grant for post-flood assessment of the species, will monitor the population.

Region 4

• **Heller's blazing star (*Liatris helleri)* -** Nearly 3,000 seedlings of this Threatened plant have been returned to wild populations in North Carolina. Seeds were collected from these populations as part of a genetic research project conducted by the University of Georgia with FWS funding. The seedlings were by-products from the research project.

The North Carolina Arboretum in Asheville held the seedlings over the winter until they were ready to be transplanted into the wild. Employees of the National Park Service (Blue Ridge Parkway), U.S. Forest Service, and FWS Asheville Field Office, along with several volunteers, donated time on their days off for the transplanting. The seedlings will significantly augment seven Heller's blazing star populations, almost all of which have been showing serious declines due in part to heavy recreational use of the rocky cliffs where they grow.

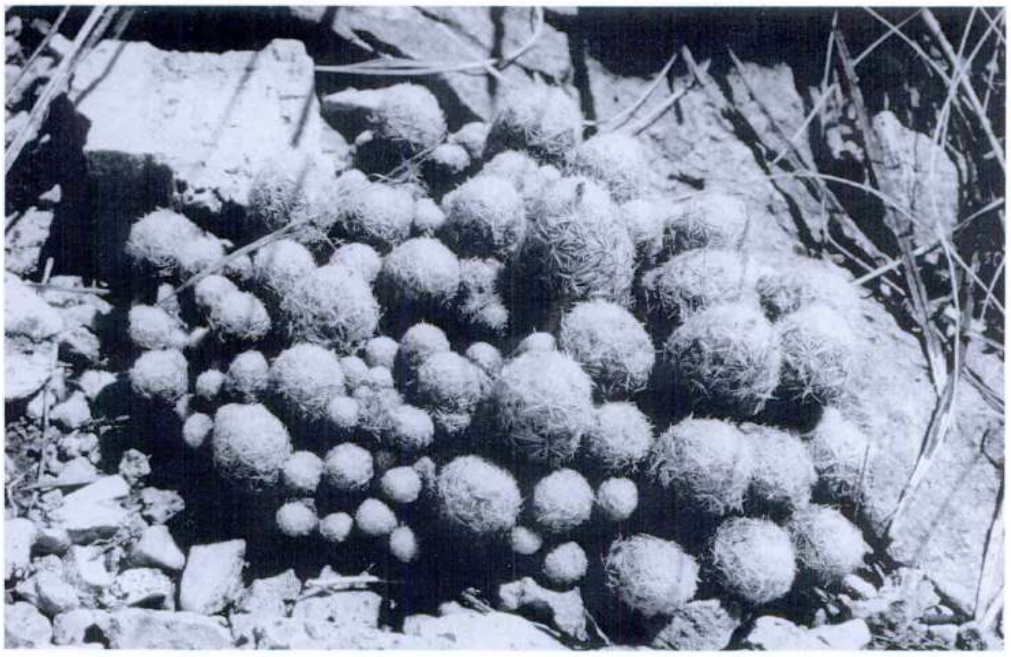

photo by Charlie McDonald

Lee pincushion cactus

Region 5

• **piping plover *(Charadrius melodus)* -** Protection of this bird by Federal, State, and private organizations has resulted in Maine having the highest average productivity (1.95 chicks per pair) of any State along the Atlantic Coast from 1988 to 1993.

• **northern flying squirrel *(Glaucomys sabrinus fuscus)* -** This Endangered mammal is found mainly in the mountains of West Virginia and adjacent portions of Virginia. Only 10 specimens were known from West Virginia prior to its listing in 1985, but since that time biologists have documented 69 site records. It has been reported from four of the five "geographic recovery areas" identified in the recovery plan, with all West Virginia occurrences in the Monongahela National Forest. The FWS is considering whether to propose reclassifying this subspecies as Threatened.

• **running buffalo clover *(Trifolium stoloniferum)* -** Also in West Virginia, significant new populations of this Endangered plant have been located and protected in the Monongahela National Forest. Landowner contacts are being made in an effort to gain the cooperation of private citizens in conserving the species on property near the national forest.

• **American burying beetle *(Nicrophorus americanus)* -** The third year of a pilot effort to reintroduce this Endangered insect at historical habitat on Penikese Island, Massachusetts, is now complete. Additional lab-reared beetles were released, and trapping confirmed that some of last year's release stock reproduced. This summer, the FWS also secured protection for habitat on Block Island, Rhode Island, that will be managed as part of the Ninigret National Wildlife Refuge. One of the purposes of the new unit is to provide protection for the only known natural population of the American burying beetle in the eastern United States.

A new fact sheet on the American burying beetle is now available from the

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Recovery Updates

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FWS New England Field Office at 22 Bridge Street, Concord, New Hampshire 03301 (603/225-1411; fax 603/225-1467).

• **Virginia big-eared bat** ***(Plecotus townsendii virginianus)*** - Known population levels of this subspecies have increased steadily from 1,300 to more than 13,000 in West Virginia and North Carolina since the bat's listing in 1979 as Endangered. Biologists believe that cave gating, which reduces the disturbance of roosting or hibernating bats, is responsible for much of the population increase.

photo by Merlin D. Tuttle, courtesy of Bat Conservation International

Two subspecies of Townsend's big-eared bat **(Plecotus townsendii),** ***including*** **P.t. virginianus,** ***are listed as Endangered.***

Endangered Species and Wetlands Conservation

by Angela V. Graziano

Across the continent, a great diversity of bird, mammal, fish, and plant species, many of which are listed as Threatened or Endangered, depend on wetlands for survival. The North American Wetlands Conservation Act, signed into law in December 1989, helped secure a future for this wealth of wildlife by establishing a program that stimulates partnerships and leverages funds to protect, restore, and enhance wetland habitats in the United States, Canada, and Mexico. Partnerships established under the North American Wetlands Conservation Program may prevent the need for some future listings by benefitting a multitude of species on an ecosystem basis.

Since 1989, the program has launched 275 wetlands conservation projects in North America. It has conserved more than one million acres of wetland ecosystems in the U.S. and Canada alone. These wetlands and adjacent uplands are host to countless species of wildlife, including such federally-listed migratory birds as the whooping crane *(Grus americana)* in the Cheyenne Bottoms, Kansas, and Quill Lakes, Saskatchewan, and the piping plover *(Charadrius melodus)* at Quill Lakes. The program also benefits Threatened plants, such as the sensitive joint vetch *(Aeschynomene virginica)* along the Maurice River in New Jersey, and listing candidates like the paddlefish *(Polyodon spathula)* at Caddo Lake, Texas. In addition, projects funded through the program affect large bioreserves in Mexico, such as the Delta Area of the Colorado River and the Upper Gulf of California. This region supports four species in danger of extinction: the totoaba or seatrout *(Cynoscion macdonaldi)*, the vaquita or Gulf of California harbor porpoise *(Phocoena sinus)*, the Yuma clapper rail *(Rallus longirostris yumanensis)*, and the desert pupfish *(Cyprinodon macularius)*.

The North American Wetlands Conservation Fund (Fund) is a multimillion dollar matching funds account authorized by the act and allocated by the public-private North American Wetlands Conservation Council. The Fund has provided more than $105 million in grants, which have been matched by more than $202 million in partner funds. These cooperative ventures focus on long-term actions such as acquisition, restoration, and education. A few of the many projects sponsored by the Fund that benefit rare and vulnerable species follow:

Alberta, Canada — The rich grasslands, parklands, ponds, and marshes that dot Canada's provinces of Manitoba, Saskatchewan, and Alberta account for 50 percent of the continent's sensitive migratory bird species, including Baird's sparrow *(Ammodramus bairdii)* and the ferruginous hawk *(Buteo regalis)*, both of which are listed in Canada as Threatened. Another bird of this region, the piping plover *(Charadrius melodus)*, is listed as Endangered in the U.S. and Canada. To conserve vital habitat in Alberta, partners pooled their resources, which were supplemented with three grants from the Fund totalling more than $3 million. By working closely with grazing associations, 13 irrigation districts, oil companies, and hundreds of individual ranchers and farmers, the part-

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Wetlands Conservation

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ners will secure 4,550 acres of existing wetlands, and will restore and manage another 4,036 acres of former wetlands. The Alberta Habitat Diversity Project marks the first time Alberta partners will implement a multi-species plan specifically designed to include habitat protection and enhancement for Threatened and Endangered species.

Cheyenne Bottoms, Kansas — A marshy basin in southcentral Kansas known as the Cheyenne Bottoms is the subject of another wetlands conservation project with benefits for vulnerable species (see sidebar). This area provides important habitat for the whooping crane *(Grus americana)*, bald eagle *(Haliaeetus leucocephalus)*, peregrine falcon *(Falco peregrinus)*, least tern *(Sterna antillarum)*, and piping plover. All five of these birds are listed in the U.S. as Endangered. Three Fund grants totalling $5.5 million, with matching partner dollars of $11.5 million, will finance projects to restore, enhance, and protect wetlands at the Bottoms that support a magnificent diversity of wildlife.

Mexico — In Mexico, where Fund projects affect large biosphere reserves, a Fund grant of $23,500 and matching partner contributions of $16,000 support a conservation education program in the Sian Ka'an Biosphere Reserve. This project is designed to educate local communities about their natural resources and encourage involvement in conservation. The information provided includes the importance of conserving habitat for the jaguar *(Panthera onca)* and several listed species of sea turtles.

The Federal share of program funding comes from a number of sources: general Congressional appropriations; interest from the Pittman-Robertson account for Federal Aid in Wildlife Restoration; the Coastal Wetlands Planning, Protection, and Restoration Act; and fines, penalties, and forfeitures resulting from enforcement of the Migratory Bird Treaty Act. Funds from the Coastal Wetlands Planning, Protection, and Restoration Act are limited to U.S. coastal States (including those bordering the Great Lakes). Reflecting the program's international scope, at least 50 percent of each fiscal year's total funds (minus Coastal funds) must support wetlands conservation projects in Canada and Mexico.

The Federal share of fiscal year 1994 funding included general appropriations of $12 million, Federal Aid interest of $6 million, and $7.5 million from the Coastal Wetlands Planning, Protection, and Restoration Act. So far in 1994, 42 wetlands conservation projects have been recommended for funding consideration by the Council. The Migratory Bird Conservation Commission has approved these projects, providing more than $19 million in grants to support wetlands conservation efforts that affect more than 4.9 million acres in the U.S., Canada, and Mexico. The 1994 grant dollars have been matched by partner dollars of more than $33 million.

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Cheyenne Bottoms

Cheyenne Bottoms is a vitally important wetland ecosystem for shorebirds and waterfowl. Forty-five percent of the shorebirds in North America, including more than 90 percent of 5 species, stop at Cheyenne Bottoms during spring migration. Designated a "Wetland of International Importance" under the Ramsar Convention, a "Hemispheric Reserve" by the Western Hemisphere Shorebird Network, and Critical Habitat for the whooping crane, the Bottoms is one of only three great wetlands complexes left in Kansas. It is a vital link for migratory birds as they travel between their breeding and wintering grounds. In addition, the Bottoms supports 9 species of fish, 17 reptiles, 8 amphibians, and 254 other bird species.

Efforts to conserve this area are supported by a diversity of partners, whose contributions have ranged from a few dollars to gifts worth more than $3 million. Additional support has come from the North American Wetlands Conservation Fund. The results to date are impressive: more than 6,000 acres of existing wetlands are protected, another 35,000 have been restored, and 13,000 more have been enhanced. Specific habitat enhancement actions have focused on water delivery and management, including the construction of a central water storage pool, hubs and water control gates, and pump stations to move water from pool to pool. A shorebird nesting island complex also was developed.

Nearly 100 partners contributed to the successful acquisition of private lands and the restoration and enhancement of existing wildlife areas in the Bottoms. In addition to the North American Wetlands Conservation Fund, major funding partners include the State of Kansas, The Nature Conservancy, the U.S. Fish and Wildlife Service, Ducks Unlimited, the National Fish and Wildlife Foundation, and the Western Hemisphere Shorebird Reserve Network.

photo by Mike Blair/Kansas Department of Wildlife and Parks

The whooping crane is one of 254 species of birds that use the Cheyenne Bottoms, Kansas.

Wetlands Conservation

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Any individual, group, or agency with a qualifying project and matching funds can apply for a wetlands conservation grant through the Fund. Grants are available for protection, restoration, and enhancement of wetlands in the U.S. and Canada. Grants are also available for wetlands restoration, management, research, and conservation education and training in Mexico. All proposals must describe the planned action, the need and location of the project, and the contributions and responsibilities of cooperating partners. Proposals are carefully reviewed by the North American Wetlands Conservation Council to ensure that each project will support and benefit long-term wetlands conservation, other wetlands values, partnerships, and biological diversity — including nongame animals, waterfowl, and endangered species.

As a result of Fund-supported wetlands conservation projects, the prospects for some of North America's biological resources are looking brighter, but much remains to be done to secure a wildlife legacy rich in diversity. Endangered species partners are encouraged to learn more about the Fund by contacting the Council Coordinator at 4401 North Fairfax Drive, Suite 110, Arlington, Virginia 22203. Deadlines for U.S. and Mexican grant proposals are the second Fridays in April and August of each year. Canadian proposal deadlines are January 1 and May 1. Brochures and grant applications are available from the U.S. Fish and Wildlife Service, Publications Unit, Mail Stop 130 WEBB, Arlington, Virginia, 22203, or by calling (703) 358-1711.

Until recently, Angela Graziano was a communications specialist with the Fish and Wildlife Service's North American Waterfowl and Wetlands Office. She is now the outreach specialist for the Service's New Jersey Ecological Services Field Office in Pleasantville, New Jersey.

Box Turtle

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were exported each year prior to 1992. Officials at the port of Chicago (which exports the largest number of box turtles) believe that 5,000 to 10,000 *T. carolina* are exported annually, mainly to Western Europe, Canada, and Japan.

After receiving information about the increasing international demand for box turtles, along with information about declining populations due to removal for export, the FWS recently began exploring options for the benefit of the species. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) provides an excellent opportunity to address the problem. This treaty, which 124 countries have signed, was established to control the impact of international trade on species of animals and plants, and to prevent their extinction due to international trade. At the biennial conferences of CITES Parties, discussions typically focus on high-profile animals such as elephants, rhinos, and tigers, but species here in the United States are also affected by international trade. Therefore, on June 10, 1994, the FWS submitted a proposal to list all species of North American box turtles in CITES Appendix II. The proposal will be considered at the November 7-18, 1994, Conference of CITES Parties in Fort Lauderdale, Florida.

CITES regulates trade in species that are listed on appendices to the treaty. Appendix I includes species that are threatened with extinction, and international trade in these animals and plants for commercial purposes is prohibited. Appendix II species are those that may become threatened with extinction unless trade is properly managed and regulated. After reviewing the available literature and comments received from the public, including State wildlife agencies and scientists with expertise in box turtle populations, the FWS concluded that box turtles qualify for inclusion on CITES Appendix II. We do not expect opposition from other governments to this proposal, which will become effective 90 days after the CITES meeting in November.

Currently, Federal regulations on box turtle exports from the United States do not exist. Even though take and commercial trade in box turtles are prohibited by law in many States, some States still allow exports. Without a CITES listing, box turtles from States that prohibit exports can be "laundered" through other States, and officials in importing countries are unable to determine the legality of a shipment. In addition, regulating the numbers of box turtles taken from the wild for international trade currently is not possible on a nationwide level.

The treaty also requires that all shipments of CITES-listed species be transported according to International Air Transport Association (IATA) regulations on the humane shipment of wild animals. This is critical because there is evidence that many box turtles have been exported under severe transport conditions, resulting in high mortalities.

Inclusion of box turtles on Appendix II will mean that an exporter must obtain an export permit from the FWS Office of CITES Management Authority (OMA). No CITES Parties will allow imports into their country without an export permit issued by OMA. Such an export permit can only be issued if a scientific determination is made by the FWS Office of CITES Scientific Authority that the export will not be detrimental to box turtle populations, and that the specimens are legally obtained. OMA will work closely with State wildlife agencies to ensure that commercial exports will be considered only from States that allow exports and have sustainably managed populations.

Although the Federal government places no restrictions on box turtle exports at this time, most States do protect these animals. However, many U.S. States with box turtle populations (e.g., Maryland, Michigan, Mississippi, Missouri, New Jersey, New York, Oklahoma, Virginia, West Virginia, and Pennsylvania) believe there is extensive

Box Turtle

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illegal trading in box turtles. In Illinois, for example, a recent undercover investigation resulted in 23 arrests for illegal sales of reptiles and amphibians, a number of which were box turtles.

In response to a notice published in the January 27, 1994, *Federal Register,* the FWS received information on population declines in box turtle populations in several States, including Connecticut, Florida, Illinois, Indiana, Iowa, Maryland, Massachusetts, Missouri, New Jersey, New York, Ohio, Oklahoma, Tennessee, Virginia, West Virginia, and Wisconsin. Over-collection for export is a serious factor in much of this decline, and may exacerbate the impacts of habitat loss.

The FWS sees the inclusion of the North American box turtles on CITES Appendix II as an excellent opportunity for cooperation in species conservation between the States and the Federal government. Comments received from the States in response to the notice indicated no opposition to CITES protection; indeed, many State wildlife agencies were extremely supportive. The FWS has also received hundreds of letters from nongovernmental organizations, scientists, and private citizens, all of whom have raised their voices in support of CITES protection for the box turtles. Together, we can all work to benefit box turtle populations, while at the same time preventing populations that have experienced recent declines from becoming candidates for listing under the Endangered Species Act. Most significantly, perhaps CITES action will galvanize public attention to the conservation needs of this once-common species so that the day will never come when box turtles disappear from the woodlands, meadows, hills, and grasslands of North America.

Dr. Lieberman is Chief of the Branch of Operations, Office of CITES Management Authority, U.S. Fish and Wildlife Service, Washington, D.C.

Box turtles are members of the family Emydidae, genus *Terrapene.* The species proposed for CITES Appendix II are *Terrapene carolina, Terrapene ornata,* and *Terrapene nelsoni.* An exclusively Mexican species, the Coahuilan box turtle *(Terrapene coahuila),* is already on CITES Appendix I, and the FWS proposal would retain it there.

The most widely distributed box turtle, *Terrapene carolina,* is found from Canada to Mexico. It is predominantly a species of open woodlands, although in the northeast it also occurs in pastures and marshy meadows and edge areas between woods and fields. The range of *T. carolina* extends from southern Maine southward to the Florida Keys and westward through Canada (Ontario) to Michigan, Illinois, eastern Kansas, Oklahoma, and Texas. In Mexico, two subspecies are found along the east coast; *Terrapene carolina mexicana* occurs in southern Tamaulipas, eastern San Luis Potosi, and northern Veracruz, while *T. carolina yucatana* is found in the northern part of the Yucatan peninsula.

A prairie turtle, *T. ornata* inhabits treeless plains and gently rolling grasslands with scattered low, brushy vegetation. One of two recognized subspecies, *Terrapene ornata ornata,* ranges over large sections of the midwestern United States and the Great Plains, from Texas north to southern South Dakota, and eastward to Indiana. The other, *T. ornata luteola,* has a much narrower range, from western Texas, southern Arizona, and New Mexico south to the northern Mexican states of Chihuahua and Sonora.

Terrapene nelsoni has a very small and fragmented range, scattered among widely disjunct high altitude localities on the west coast of Mexico. *Terrapene nelsoni* occurs in the Mexican state of Nayarit. Very little is known about the status or distribution of *T. nelsoni klauberi,* which is found in the states of Sonora and Sinaloa.

Urbanization, agricultural development, logging, and road construction have fragmented or eliminated box turtle habitats, especially in the northeast. When coupled with habitat loss and the species' naturally low reproduction rate, over-collection becomes a serious threat. Because most box turtles in trade are adults, commercial trade may have its greatest impact on the reproductive portion of box turtle populations.

Several State wildlife officials report that all box turtles in commercial trade are wild-caught. It is not commercially feasible at this time to breed box turtles in captivity to marketable size, due to the fact that they are slow growing and take 10 to 20 years to reach sexual maturity.

Regional News

(Continued from Page 2)

Office of the National Biological Survey (NBS) have been removing fire debris from the stream channels in an attempt to accelerate rehabilitation of Moapa dace habitat. NBS biologists will monitor habitat conditions and the populations of affected aquatic species.

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The FWS Reno Office and Desert National Wildlife Refuge Complex staff met with invertebrate specialists Dan and John Polhemus at the Ash Meadows National Wildlife Refuge to discuss management needs of the Ash Meadows naucorid *(Ambrysus amargosus)*. This flightless aquatic insect has been relegated to a fraction of its historically limited range at Point of Rocks Spring due to habitat alteration or destruction. Population levels are extremely low. Improving the status of this species may require a temporary shut-down of new habitat created for another Endangered species, the Devils Hole pupfish *(Cyprinodon diabolis)*. The water supply for this created habitat is piped from one of the springs that still support Ash Meadows naucorids. The Southern Nevada Desert Springs Recovery Team will be consulted in the near future on this issue.

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Region 2 — The FWS Field Office in Clear Lake, Texas, participated with local U.S. Forest Service biologists in activities for "Celebrating Wildflowers Week" this spring. The office assisted in arranging a day-long series of educational presentations, workshops, and nature walks that emphasized the importance of native wildflowers, including listed species and listing candidates. A visual display identified the rare species of eastern Texas, the reasons for their endangerment, and things the general public can do to help. The display was also erected at the grand opening of an Endangered Species Garden at Houston-based Mercer Arboretum and Botanic Gardens. The Mercer center is a participating member of the Center for Plant Conservation, and houses cultivated populations of several listed and candidate plant species. A number of public officials were present at the grand opening and offered positive comments on the display.

*****

The FWS Arizona Ecological Services Office is developing a conservation agreement to benefit the Ramsey Canyon leopard frog *(Rana subaquavocalis)*. This species, which was described just last year, is currently known to breed at only two sites, including a livestock tank and a cement cistern in the Huachuca Mountains of southeastern Arizona. The total number of adult frogs at both sites is estimated at no more than 120. A team consisting of representatives from the Coronado National Forest, U.S. Army (Fort Huachuca), The Nature Conservancy, Arizona Game and Fish Department, a private landowner, and the herpetologist who described the species is developing a conservation strategy to ensure the maintenance of existing habitat and plan for the development of new habitat for establishing additional populations.

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The proposed reclassification of the bald eagle *(Haliaeetus leucocephalus)* announced by Director Beattie on June 30, 1994, (see *Bulletin* Vol. XIX No. 4) will not upgrade the southwestern population from Endangered status. This small population continues to face threats and requires intensive management to be maintained at its current level. It is comprised of approximately 35 nest territories, with all but two in Arizona. Most of Arizona's eagles are concentrated along the Salt, Verde, and Gila Rivers just east of the large Phoenix metropolitan area. In 1994, 27 (81 percent) of Arizona territories were occupied, but only 12 (36 percent) were successful, fledging a total of 18 young. This performance of 0.66 fledglings per occupied territory is below the 0.81 average over the preceding 20 years. The two territories in New Mexico were both successful in 1994, fledging a total of three young. The population faces continued threats of habitat degradation, accidental and malicious harassment, chemical contamination, and lethal entanglement of adults and nestlings in discarded fishing line and tackle. The population has expanded recently, with five new territories becoming established in the last

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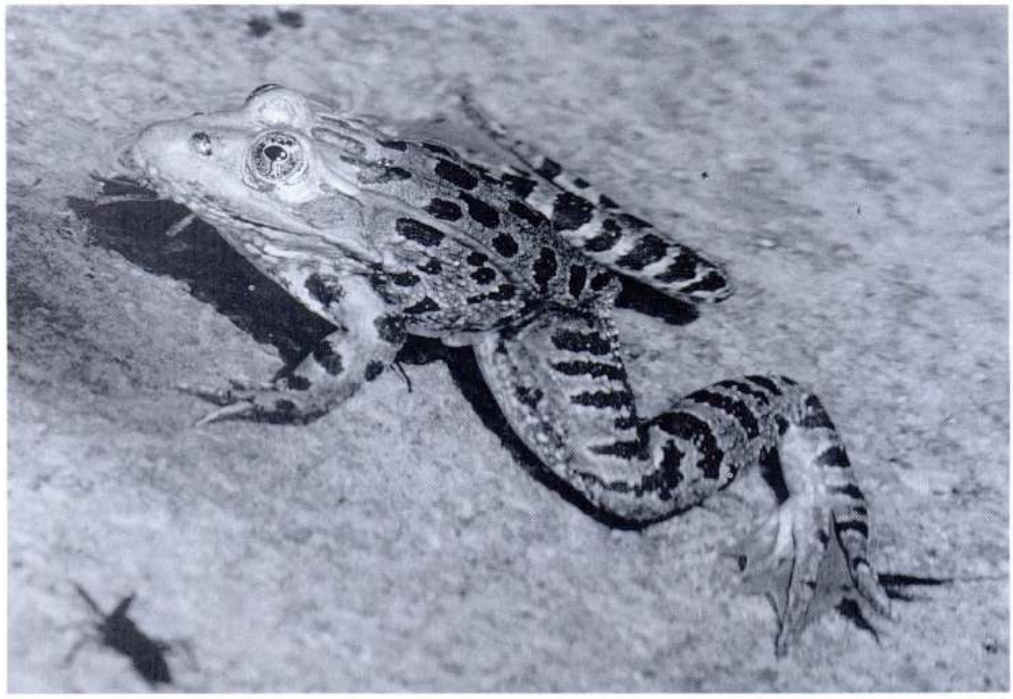

photo by Tom Woods

The Ramsey Canyon leopard frog, first described in 1993, is known to breed at only two sites in the Huachuca Mountains of southeastern Arizona.

Regional News

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three years. Unfortunately, two of those have since gone unoccupied. The southwestern population is largely maintained by intensive, cooperative management through the Southwestern Bald Eagle Management Committee, which includes representatives from various Federal and State agencies, Indian Nations, and private organizations.

The Phoenix Zoo reports that 34 black-footed ferret *(Mustela nigripes)* kits were born at the zoo's breeding facility this year. Of the 34 kits born, 17 survived. Because the losses may have been connected to temperature related factors, a new cooling system was installed. The zoo has not lost a kit since the new system was put in place. This breeding facility has produced some of the largest black-footed ferret litters in the nation (up to nine kits).

The New Mexico Endemic Salamander Team is in the final stages of completing a draft management plan for the Jemez Mountain salamander *(Plethodon neomexicanus)* in accordance with a Conservation Agreement signed by FWS, the New Mexico Department of Game and Fish, and the U.S. Forest Service. As a result, a petition to list the species was found "not warranted," and its position as a candidate for possible future listing was moved from category 1 to category 2.

Region 3 — In June, one of the rarest birds in the world, the Kirtland's warbler *(Dendroica kirtlandii)*, was honored during the 1st Annual Kirtland's Warbler Festival. Sponsored by the Chamber of Commerce in Oscoda County, Michigan, the 10-day festival included activities for all age groups. Members of Congress and agency representatives participated in the festival parade and officially opened a 48-mile self-guided auto tour route during a ribbon-cutting ceremony. On Friday, June 10, media were invited to accompany biologists to record the sounds and sights of male warblers returning to stake out their territories and search for mates. Secretary Babbitt made a visit to the county on June 17 and was pleased by a close-up view of a singing male warbler.

Region 4 — A new exhibit entitled *Our Threatened Ecosystems* has been developed by the FWS Asheville, North Carolina, Field Office and the FWS Southeast Region's Division of Public Use Management (Refuges and Wildlife). The exhibit defines an ecosystem, gives examples of various ecosystems and the listed species found within them, shows threats to ecosystems, and gives reasons why we should care about conservation. Fact sheets are being developed to accompany the exhibit. Approximately 2,000 people have seen the exhibit, which has been on display at seven public events. Comments about the exhibit from natural resource professionals and the public have been positive.

Region 7 - FWS biologists in Region 7 have been pleasantly surprised to learn that news travels well even through the far reaches of western Alaska. In the past six months, two spectacled eiders *(Somateria fischeri)* were rescued by Native Alaskans in remote villages. Since these birds were listed as Threatened in 1993, FWS biologists have worked to inform rural residents that populations of spectacled eiders have declined drastically. These eiders breed in western and northern Alaska and along the arctic coast of Siberia. Spectacled eiders are thought to winter on open ice in the Bering Sea.

In early January, a Wales resident noticed a lone bird perched on a snow drift. The bird seemed oblivious to snow machines buzzing around it. "At first I thought she was resting before moving on," said Vincent Okpealuk, the rescuer. Upon closer investigation, Okpealuk found the bird was injured and could not fly. He immediately called the FWS Anchorage Regional Office and asked what he should do. "I knew that she was on the endangered species list and I wasn't sure if I should approach her," Okpealuk said. Following instructions from FWS biologists, Okpealuk captured the eider and placed her in a cardboard box. He then located a helicopter pilot who flew the bird to Nome, where an Alaska Airlines crew took over and flew the bird to Anchorage. The eider was placed in the care of a local veterinarian who diagnosed her as suffering from a broken wing and dehydration. Three weeks later, the eider was shipped to the Franklin Park Zoo in Tacoma, Washington. Despite apparent good health, the bird died in April.

A second spectacled eider was rescued in the village of Savoonga on St. Lawrence Island. This bird had been seen flying into a snow bank. Upon inspecting the eider, local resident Terry "Stormy" Kiyuklook realized that its eyes were frosted over, rendering it blind. He recognized the bird from FWS posters that had been distributed to inform rural residents about the listing of the species. Kiyuklook put the eider under his coat and carried it home where he and his family fed it rice and soup for several days. An FWS biologist happened to be visiting Savoonga and was told of Stormy's rescue effort. The eider, a young male, was flown to Anchorage and placed under veterinary care. Early in May, the bird was shipped to a zoo in Boston that has a good track record of rearing eiders.

Both rescued birds exhibited a peculiar condition: they were unable to waterproof their feathers. This condition is characteristic of captive birds not regularly exposed to sunshine and water. Inability to waterproof might be a clue to the decline in spectacled eider numbers. The Wales eider and other spectacled eiders found dead in the last year are being analyzed for contaminant residues in hopes of learning more about their condition at death.

BOX SCORE
LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S.	ENDANGERED Foreign Only	THREATENED U.S.	THREATENED Foreign Only	LISTED SPECIES TOTAL	SPECIES WITH PLANS
Mammals	56	251	9	22	338	37
Birds	75	153	17	0	245	73
Reptiles	16	63	19	14	112	30
Amphibians	6	8	5	0	19	9
Fishes	65	11	38	0	114	63
Snails	14	1	7	0	22	27
Clams	50	2	6	0	58	40
Crustaceans	14	0	3	0	17	4
Insects	19	4	9	0	32	16
Arachnids	4	0	0	0	4	0
Plants	403	1	85	2	491	184
TOTAL	722	494	198	38	1,452 *	483 **

Total U.S. Endangered 722 (319 animals, 403 plants)
Total U.S. Threatened 198 (113 animals, 85 plants)
Total U.S. Listed 920 (432 animals, 488 plants)

* Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, chimpanzee, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

** There are 399 approved recovery plans. Some recovery plans cover more than one species, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of CITIES Party Nations: 124

October 1, 1994

September/October 1994 Vol. XIX No. 5

ENDANGERED SPECIES

Technical Bulletin

Department of Interior, Fish and Wildlife Service
Washington, D. C. 20240

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November/December 1994 Vol. XIX No. 6

ENDANGERED SPECIES

Technical Bulletin

U.S. Department of the Interior
Fish and Wildlife Service

Wolf Reintroduction Approved for Yellowstone and Central Idaho

photo by John and Karen Hollingsworth

Recovery of the gray wolf *(Canis lupus)* in the northern Rocky Mountains moved a step closer November 22, 1994, when the Fish and Wildlife Service (FWS) approved a plan to establish experimental populations of this Endangered animal in Yellowstone National Park and central Idaho.

Separate rules published in the *Federal Register* outlined how the FWS will conduct reintroductions and the manner in which wolves will be managed once released. The rules, one addressing reintroduction in Yellowstone National Park and the other in central Idaho, describe reintroduction methods and designate wolves in each area as "non-essential, experimental" populations under Section 10(j) of the Endangered Species Act. This provision of the Act allows Federal and State resource agencies and private citizens greater flexibility in managing reintroduced animals.

Specifically, such a designation will allow wolves to be killed, under certain conditions, if they are preying upon livestock. Although unlikely, if wild populations of deer, elk, and other large game are affected severely by wolf predation, wolves could be moved under an approved State management plan.

Wolves within the boundaries of two areas — one in and around Yellowstone National Park and the other in and around the central Idaho wilderness areas — are designated as non-essential experimental. Neither of these areas currently supports breeding wolves. The experimental population area for the Yellowstone region includes the entire State of Wyoming, a portion of southeastern Idaho east of Interstate 15, and a portion of Montana east of

(Continued on Page 19)

Regional News

Regional endangered species contacts have reported the following news:

Region 1 —As a result of trapping efforts funded by the FWS Boise, Idaho, Field Office, the Selkirk Ecosystem of the grizzly bear *(Ursus arctos)* recovery area now has three radio-collared grizzlies. Prior to this effort, no radio-collared grizzly bears existed in this ecosystem, the last one having been shot in November 1993. Radio-collared bears are extremely beneficial to population monitoring activities. The ongoing trapping effort is a joint venture involving the Boise Field Office (Region 1), Grizzly Bear Recovery Coordinator's office (Region 6), and Idaho Department of Fish and Game.

*****

Representatives of the FWS Northern Idaho Field Office have completed a partial survey of gates that were installed to control vehicular access to Bear Management Units (BMU) in the Selkirk Ecosystem, and four BMU's within the Cabinet-Yaak Ecosystem, within the Idaho Panhandle National Forest. Survey results indicate that most seasonal barriers on designated "restricted roads" are not effective, and can be bypassed easily by most all-terrain vehicles and off-road motorcycles. Under current conditions, the FWS believes that the roads may need to be reclassified as "open motorized trails," as defined by the latest road management guidelines from by the Interagency Grizzly Bear Committee. The FWS is proposing to meet soon with the Interagency Grizzly Bear Committee and the Forest Service to discuss the ineffective barriers and the need to readjust security within the BMU's.

*****

Robert Smith, Supervisor of the FWS Pacific Islands Field Office, addressed an international group of journalists (including representatives from the *Los Angeles Times, Philadelphia Inquirer, USA Today*, and five Japanese newspapers) at the East-West Center in Honolulu on August 17. The speech, entitled "Implications of Habitat Restoration Efforts for Private Landowners," focused on the use of partnerships to promote native species conservation in Hawaii and the need for adequate legal tools, including an important change to the State of Hawaii's endangered species law.

*****

(Continued on Page 16)

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U.S. Fish and Wildlife Service Regions

Region 1: California, Hawaii, Idaho, Nevada, Oregon, Washington, American Samoa, Commonwealth of the Northern Mariana Islands, Guam, and the Pacific Trust Territories. **Region 2**: Arizona, New Mexico, Oklahoma, and Texas. **Region 3**: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. **Region 4**: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Puerto Rico and the U.S. Virgin Islands. **Region 5**: Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia. **Region 6**: Colorado, Kansas, Montana, Nebraska, North Dakota, South Dakota, Utah, and Wyoming. **Region 7**: Alaska.

Rediscovery of the Palos Verdes Blue Butterfly

by Marjorie Nelson

photo by B."Moose" Peterson/WRP

Adult male Palos Verde blue butterflies have vivid, silvery-blue wings. Females have more subtle coloring; their brown-grey wings are tinged with blue iridescence. Both sexes are a buff-grey color on the underside, have black spots ringed with white on their wings, and are covered with blue hairs.

On March 10, 1994, Fish and Wildlife Service (FWS) biologist Dr. Rudi Mattoni rediscovered the Palos Verdes blue butterfly *(Glaucopsyche lygdamus palosverdesensis)* on the grounds of a Department of Defense facility in San Pedro, California, while conducting a survey for ground-dwelling insects. This relatively showy subspecies was last observed in 1983, and was presumed by many to be extinct as a result of habitat loss (Mattoni 1993). It is endemic to the Palos Verdes Peninsula in Los Angeles County, California, and is associated with coastal sage scrub, a declining and greatly fragmented plant community in the region.

When the Palos Verdes blue was listed in 1980 as Endangered, seven colonies remained, although only one was considered large enough to be self-sustaining (USFWS 1984). Following the butterfly's rediscovery this year, FWS entomologists Chris Nagano and Marjorie Nelson made several additional butterfly sightings outside the Defense facility. The population is estimated to number 200 butterflies.

The Palos Verdes blue butterfly was thought to use rattlepod *(Astragalus trichopodus* var. *lonchus)* exclusively as the larval host plant during reproduction. Females have since been found to deposit their eggs on the flowers and fruits of deerweed *(Lotus scoparius)* as well. Caterpillars (larvae) hatch from eggs in 7 to 10 days and begin feeding on the host plant. Near the end of their larval stage, Palos Verdes blue caterpillars may be tended by ants. The larvae of other *G. lygdamus* subspecies secrete a sugary substance that is eaten by the ants. In return, the ants may protect the caterpillars from predators and parasitoids. Adults emerge during February and March and live for an average of only 4 days (Mattoni 1994).

The Palos Verdes blue population rediscovered by Dr. Mattoni was located in an area proposed for a pipeline project. The coastal California gnatcatcher *(Polioptila californica californica)*, a Threatened bird, also occurs in this region. The Department of Defense currently is working with FWS biologists to develop strategies to conserve both the Palos Verdes blue butterfly and the coastal California gnatcatcher. In addition, Chevron has provided funding for Dr. Mattoni to sample vegetation in the pipeline area in order to determine its suitability for recolonization by these unique species.

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Mattoni, R. H. T. 1994. Current status of the Palos Verdes blue butterfly at the U. S. Navy fuel storage reserve, San Pedro, California. Agresearch Inc. report prepared for Chevron Oil.

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United States Fish and Wildlife Service (USFWS). 1984. The Palos Verdes Blue Recovery Plan. Prepared by Dr. Richard A. Arnold, Department of Entomology, University of California.

Marjorie Nelson is a biologist in the FWS Carlsbad, California, Field Office.

Partners in Flight: Conserving a Shared Resource

by Daniel R. Petit

Nearly 700 bird species regularly breed on the North American continent north of Mexico. Although relatively few bird species have become extinct since the arrival of European settlers, the populations of many taxa have fallen. This decline in the populations of many once-common land birds initially was sensed by many ornithologists in the late 1960's, and many of those disheartening trends have since been confirmed. Several groups of species showed striking losses in the 1980's. Declines were especially pronounced in Neotropical migrants — birds that breed in North America but spend the northern winter at tropical or subtropical latitudes.

Most avian ecologists agree that the population declines are the result of increasing habitat alteration and land use changes during the past few decades. Many species that nest in large tracts of eastern North American forests or open grasslands of the Midwest and Great Plains are affected by habitat fragmentation, vegetational succession, conversion to cropland, and wetland drainage. But because not all species within a given habitat, region, or ecological guild exhibited population trends in the same direction, scientists believed that other factors also were influencing populations. Concern also was voiced about whether existing U.S. legislation could prevent further declines.

All native avian species found in the United States are protected from indiscriminate killing by the Migratory Bird Treaty Act (as amended), enacted in 1918. This powerful law, which implements agreements with Great Britain (on behalf of Canada), Mexico, Japan, and the former Soviet Union, makes it unlawful to kill, capture, harass, purchase, or otherwise "take" any migratory bird without authorization. Although the Act controls many adverse activities, it probably was not intended to stem the types of habitat-based actions most likely behind the widespread declines of Neotropical birds.

In 1988, Congress passed the "Mitchell Amendment" to the Fish and Wildlife Conservation Act of 1980. This amendment directs the Secretary of Interior to (1) monitor and assess population trends of migratory nongame birds, (2) identify the effects of human activities on those species, (3) identify migratory species of management concern, and (4) identify actions to prevent species of concern from becoming endangered. Thus, although various laws were in place to protect and monitor migratory birds, the documented alteration and loss of critical breeding habitat, even on public lands, warranted additional action to address the problems at hand.

photo by Daniel R. Petit

The prothonotary warbler* (Protonotaria citrea) *nests in mature bottomland hardwood forests, a habitat type that has been disappearing at a rapid rate. During the past 25 years, as habitat has been lost, prothonotary warbler populations have declined 1.5 percent annually. The Partners in Flight program is carrying out plans to conserve bottomland hardwood forests for this and a host of other bird species.

Partners in Flight

Recognizing the need to bring more attention to the 250 or so migratory nongame species, the National Fish and Wildlife Foundation (Foundation) assembled about 150 scientists, educators, and resource managers at a workshop in 1990. The result was creation of the Neotropical Migratory Bird Conservation Program, popularly known as "Partners in Flight" or *"Aves de las Americas."*

The goal of Partners in Flight is to conserve, enhance, or restore declining populations of Neotropical land birds before they need Endangered Species Act protection. To help achieve such a challenging goal, a network of technical, geographical, and organizational committees has been established. After 4 years, an effective organization supported by 15 Federal agencies, more than 60 State and provincial natural resource agencies, approximately 30 nongovernmental

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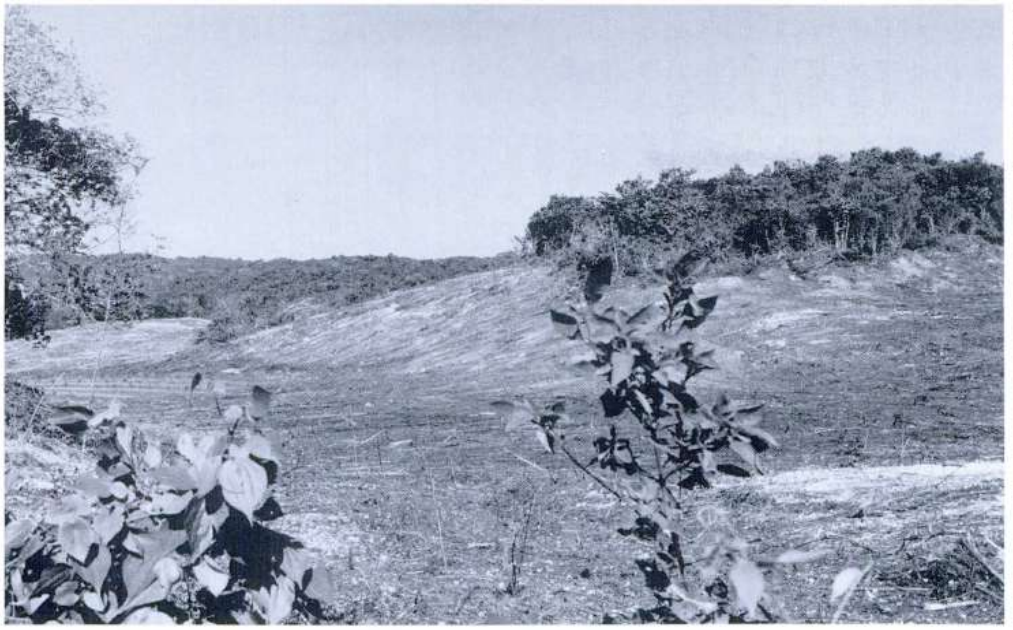

photo by Daniel R. Petit

Conversion of native habitat is the most serious problem faced by Neotropical migratory birds in both breeding and wintering areas. Large tracts of tropical forest are being replaced by pastures and agricultural land, such as this citrus grove in Belize. Through its international network, Partners in Flight cooperates with local Latin American groups to better conserve and manage our shared wildlife resources.

Partners in Flight

(Continued from previous page)

organizations (NGOs), and various private-sector corporations is in place.

Conserving Migratory Birds Through Partnerships

The Partners in Flight effort does not focus primarily on Threatened and Endangered species, or on listing candidates, but attempts to prevent populations from reaching the point at which it becomes necessary to give them special protected status. Partnerships among Federal agencies, States agencies, and NGOs have become widespread within conservation programs during the past 10 years, and Partners in Flight has nurtured numerous ventures of this sort. The incentive for public-corporate partnerships, a more unusual type of alliance, lies in the shared desires of partners to preserve our natural heritage while providing economic opportunity and a quality standard of living.

Partners in Flight has benefitted through the participation of private corporations, particularly the forest products industry. Currently, 14 such companies have assisted with research, management, and population monitoring activities. In Maine, for example, Scott Paper Company, Champion International, Great Northern Paper Company, and the National Council for Air and Stream Improvement have supplied funding, logistical support, professional personnel, and access to databases for a research project organized by Manomet Observatory. This massive undertaking is designed to evaluate the effects of timber harvesting practices on the distribution and reproductive ecology of terrestrial land birds. The 3-year project, initiated in 1992, will provide critical data on the types of forest habitats used by Neotropical migrants in the Northeast. It also will identify the types of local and landscape-level information needed by industry to more effectively sustain timber yields and wildlife populations. Working independently, neither Manomet scientists nor the timber companies could have developed such a balanced approach.

In another notable initiative, Phillips Petroleum and Amoco Production Company have teamed up with NGOs (Houston Audubon Society, The Nature Conservancy), the Fish and Wildlife Service, State agencies, businesses (e.g., Fermata, Inc.), the Foundation, other wildlife conservation programs, and citizen volunteers to conserve a valuable migration stopover area along the Gulf coast of east Texas and western Louisiana. The project is aimed at restoring and protecting patches of woodland within the Chenier Plain, a narrow coastal strip that is the first stop for millions of birds after flying nonstop 600 miles (965 km) over the Gulf of Mexico during spring migration. Because birds can lose up to 50 percent of their body mass during this flight, high quality wooded habitat is pivotal for completion of the migratory trek to their breeding grounds. This area also is the last feeding stop for migrants before they cross the Gulf on their southward journey in autumn. Thus far, hundreds of acres have been restored and several million dollars invested towards improving this important stopover habitat.

Conserving habitat on breeding grounds and along migration routes is not enough; wintering habitat also must be conserved. Toward that end, Partners in Flight established three coordinators in Latin America and the Caribbean in 1993. Currently, several dozen research and outreach programs directed by Partners in Flight have been completed or are under way in wintering areas. Education and outreach projects range in scope from development of elementary school material on migratory birds in Mexico to internships with U.S. natural resource agencies and the promotion of wildlife curricula in Latin American universities. Research and conservation projects are being conducted from the Amazon Basin north to the U.S. border. A common theme among these programs is the need to integrate protection of native biodiversity with sustainable economic growth.

Partners in Flight, as the name implies, is a partnership — it has no employees or address. The aim is to provide sound management plans to public and private land stewards, and to help identify new ways for partners to combine their resources for the restora-

(Continued on Page 6)

Working Together for the Great Lakes Piping Plover

by Kelly Millenbah

An extensive partnership has been formed to restore the Great Lakes population of the piping plover *(Charadrius melodus)*, one of our nation's rarest shorebirds. The cooperators include the Fish and Wildlife Service (FWS), Michigan Department of Natural Resources, University of Minnesota, North Central Michigan College, Lake Superior State University, and the National Park Service.

In recent decades, this stocky shorebird has disappeared from much of its historical range in the Great Lakes region and is now limited to the shores of Lakes Michigan and Superior in northern Michigan. In 1994, monitoring and protection efforts identified only 19 piping plover breeding pairs in the Great Lakes region (a slight increase from 18 pairs in 1993).

Through State-administered funds issued under Section 6 of the Endangered Species Act, the FWS East Lansing, Michigan, Field Office initiated two cooperative agreements this year to coordinate protection of the piping plover. The University of Minnesota, through the Minnesota Cooperative Fish and Wildlife Research Unit, was contracted to use Geographical Information Systems and a Global Positioning System for analysis of principal plover nesting areas. The purpose of this work was to develop concise visual displays of plover nesting history, habitat use, and habitat availability in the Great Lakes region. Also included in this agreement was identification and evaluation of primary causes of disturbance to piping plover reproductive success. Individual nests were monitored using remote video cameras to determine levels and sources of disturbance.

Section 6 funds also were used to build predator exclosures, post plover nesting areas, and monitor nest sites at least once per week. University of Minnesota researchers led monitoring and protection efforts at sites in Michigan's lower peninsula, with a seasonal Michigan State employee heading up efforts at Wilderness State Park, Emmet County, Michigan.

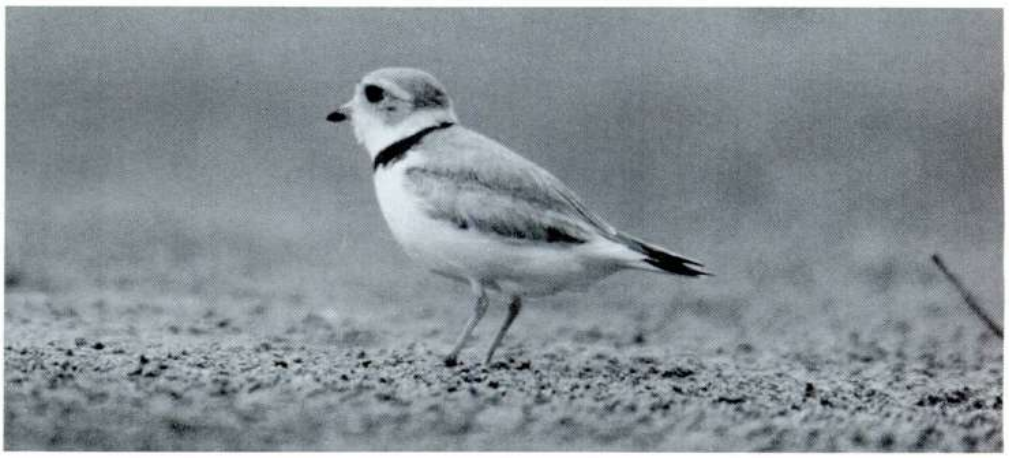

photo by Mark Bryer

Piping plovers* (Charadrius melodus) *are distinguished by their pale plumage, black neck ring, large eyes, and bright orange legs.

In addition, a professor and 10 undergraduate students from North Central Michigan College braved black flies, mosquitoes, and severe thunderstorms to observe a plover nest continuously for 18 days after the chicks hatched in Wilderness State Park. Their around-the-clock observations helped identify potential predators and protected the young birds during a critical period of chick development.

Other monitoring and protection efforts were carried out in cooperation with the National Park Service and Lake Superior State University. In 1994, 4 plover breeding pairs were identified at Sleeping Bear Dunes National Lakeshore on North Manitou Island. National Park Service rangers kept close tabs on the status of the breeding plovers and their chicks. Rangers also closed beaches where plovers nested and used signs to explain the Lakeshore's role in their protection.

In Michigan's Upper Peninsula, monitoring and protection efforts were conducted by a researcher from Lake Superior State University.

These partners, with the support of the FWS and Michigan Department of Natural Resources, are pursuing a goal beyond the reach of any single organization or agency: recovery of the Great Lakes piping plover. Continued support will be necessary to reach that goal.

Kelly Millenbah is a wildlife biologist with the FWS East Lansing (Michigan) Field Office.

Partners in Flight

(Continued from page 5)

tion and conservation of Neotropical migratory birds.

The Partners in Flight network continues to grow. For more information, write Peter Stangel, National Fish and Wildlife Foundation, 1120 Connecticut Avenue NW, Suite 900, Washington, D.C. 20036, or Dan Petit, USFWS, Office of Migratory Bird Management, 4401 North Fairfax Drive, Room 634, Arlington, Virginia 22203.

Dan Petit, the Fish and Wildlife Service's Neotropical Migratory Bird Coordinator, is a wildlife biologist in the Office of Migratory Bird Management.

Cooperative Projects Aid Hawaiian Wildlife

The Kilauea Project

The Fish and Wildlife Service (FWS) recently entered into a cooperative agreement with Federal, State, and private agencies providing for cooperative management of thousands of acres of native forest on the island of Hawai'i near Kilauea volcano. This area provides habitat for many native Endangered Hawaiian species, including four forest birds, the Hawaiian hoary bat, and several plants. Other cooperators in the agreement include the Kamehameha Schools Bishop Estate (the largest private landowner in the State), Hawaii Department of Public Safety, Hawaii Division of Forestry and Wildlife, and National Park Service (Hawaii Volcanoes National Park).

One of the first management goals will be to eliminate feral pigs within the 4,200 acres of forest to protect native plants and wildlife habitat. (See "Killer Pigs, Vines, and Fungi" in *Bulletin* Vol. XIX, No. 5.) Rooting by pigs destroys plants and creates pockets of standing water that allow mosquitoes to breed. The mosquitoes carry avian pox and avian malaria, diseases that kill native forest birds.

Ultimately, FWS hopes to use this cooperative agreement and its newly formed partnerships as a means to provide some protection for the 100 square miles of forest in the Kilauea area. Informal discussions have been going on for several years about how to manage the natural resources of this area given its fragmented ownership. The partners hope this agreement is the start of a cooperative relationship between landowners in the area and natural resource agencies to find innovative ways of increasing environmental protection for Hawaii's native species.

photos courtesy of Barbara Maxfield, FWS Pacific Islands Field Office

Students at the Hawaii Nature Center learn about invertebrates as part of a new wetlands education program at Honouliuli.

Honouliuli Environmental Education Project

In 1993, the Hawaii Nature Center and the FWS initiated a new wetlands education program for third grade students on the island of O'ahu. It took place at the Honouliuli Unit of the Pearl Harbor National Wildlife Refuge. Normally closed to the public to protect endangered Hawaiian waterbirds and migratory birds, the refuge was opened on a limited and closely-monitored basis for an experimental program designed by the Hawaii Nature Center. After biologists found no impact on the birds, at least during the nonnesting season, the FWS agreed to expand the program during the 1994-95 school year.

Each day from September through December, Hawaii Nature Center environmental educators will guide about 60 students in small groups through the refuge. Teachers are required to attend pre-visit planning conferences to prepare their students for the visit. The program has been enthusiastically accepted by local teachers — so much so that all of the available dates were booked during the first three hours the Hawaii Nature Center accepted reservations.

Program development was supported not only by the FWS, but also by several private sponsors: the James and Abigail Campbell Foundation, the Estate of James Campbell, Chevron USA, the Harold K. L. Castle Foundation, and the Atherton Family Foundation. Monitoring of impacts on the refuge and its birds will continue this year, but the long-term benefits of educating Hawaii's youth are expected to far outweigh any impacts on the refuge or its resources.

Chevron USA Cooperative Agreement

The middle of an oil refinery doesn't sound like the best place for endangered Hawaiian waterbirds to build their nests, but to a number of ae'o or Hawaiian stilt *(Himantopus mexicanus knudseni)*, it's an attractive home. Indeed, the Chevron refinery may have produced more young stilt than any other comparably sized wetland area on O'ahu during the past three years.

In April 1992, officials from Chevron USA's O'ahu refinery called the FWS to ask how to discourage Hawaiian stilt from using their containment ponds. The largest pond, known as Roland Pond, includes about 6 acres of open water and mudflat habitat. It contains rainwater runoff and treated effluent rich in natural microbes and algae that support the invertebrate populations upon which the birds feed. The site

(Continued on Page 8)

Banding Together for the Florida Grasshopper Sparrow

by Michael F. Delany

State and Federal agencies and conservation organizations have banded together, literally and figuratively, in a partnership to recover the Florida grasshopper sparrow *(Ammodramus savannarum floridanus)*. Information gathered through banding studies and surveys of singing birds is providing information land managers can use to prevent extinction of this rare bird.

The Florida grasshopper sparrow, discovered in 1901, is endemic to the State's south-central prairie region. During the breeding season, it is isolated from other grasshopper sparrow subspecies by more than 310 miles (500 kilometers). Early reports imply that the Florida subspecies had a relatively large, widespread population within this region. The conversion of dry prairie to improved pasture for cattle grazing may have eliminated the sparrow from some of its former range. In 1986, the Florida grasshopper sparrow was listed as Endangered because of its restricted distribution, loss of habitat, and declining numbers.

According to the Florida Grasshopper Sparrow Recovery Plan, the sparrow can

(Continued on next page)

Hawaiian Co-op Projects

(Continued from page 7)

also has little surrounding vegetation in which predators can hide. Because the stilt had already begun nesting at the pond, Chevron officials agreed to protect the nesting area for the season and allow the FWS to monitor the birds.

In 1993, Chevron USA entered into a cooperative agreement with the FWS to protect stilt and migratory shorebirds at the refinery, and to provide suitable feeding and nesting habitat for the stilt at Roland Pond. Chevron maintains specified water levels in the pond during the stilt's breeding season (March through August) to ensure adequate foraging habitat for adults and chicks. The FWS is allowed access to monitor the birds throughout the nesting season. In 1992, 24 Hawaiian stilt successfully fledged from Roland Pond. In 1993, the number of fledged birds increased to 36, and in 1994, 51 birds were raised at the site.

Hawaiian (black-necked) stilt at Chevron's Oahu facility. These distinctive black and white birds use their long pink legs and straight black bills to wade and forage in ponds, on mudflats, and in wet grassy areas of the Hawaiian islands.

'Alala Cooperative Effort

When the known population of a species in the wild numbers only 12 birds, it takes an intensive effort by many partners to prevent its extinction. Fortunately for the 'alala or Hawaiian crow *(Corvus hawaiiensis)*, that effort is under way. The FWS, Hawaii Department of Land and Natural Resources, National Biological Survey, The Peregrine Fund, National Audubon Society, Hawaii Audubon Society, and the private landowners at Kai Malino, Kealia, and McCandless Ranches have joined together to save this critically endangered species. The recovery efforts began in 1993, based on recommendations from the National Academy of Sciences and the 'Alala Recovery Team. For details, see the 'alala feature in *Bulletin* Vol. XVIII, No. 3.

The Peregrine Fund has undertaken the rearing and hacking responsibilities under a cooperative agreement with the FWS, and will be constructing and operating a captive propagation facility on the Big Island next year, in part for the 'alala. In a parallel effort, the State of Hawaii operates the Olinda Endangered Species Propagation Facility on Maui, where 14 'alala now reside. Some of the chicks from the wild and from Olinda are exchanged to increase the genetic diversity of the captive breeding flock. The remaining chicks are released back to the wild from a hacking facility built by The Peregrine Fund on State-owned land within the privately owned ranches. Since all of the species' nesting territories, and most of the birds, are on private land, the cooperation of landowners is a key factor in the recovery effort.

With the assistance of all of the partners, 12 young 'alala have been released to the wild during the past 2 years, and the captive breeding flock at Olinda has been expanded by 6 birds. FWS biologists closely monitor the wild flock throughout the year.

In addition, National Biological Survey biologists are conducting research on avian pox and avian malaria, two mosquito-borne diseases that may have played a role in the decline of the 'alala.

The above examples are courtesy of Robert Smith, Supervisor of the FWS Pacific Islands Field Office in Honolulu, Hawaii.

photo by Michael Delany

Florida grasshopper sparrow

Grasshopper Sparrow

(Continued from previous page)

be reclassified to the less critical category of Threatened if 50-100 breeding pairs become established at each of 10 secure, discrete sites throughout its former range, and can be delisted if established at 25 such sites[1]. Results from singing male surveys conducted by the Florida Game and Fresh Water Fish Commission (Commission), U.S. Air Force, volunteers, and a private consultant (Alvarez, Lehman and Associates, Inc.), however, do not indicate that a change in the bird's classification is warranted at this time. Of the nine sparrow locations known at the time of listing, the bird remains at only three. Abandoned locations on private lands have been plowed and planted with non-native grasses to improve cattle grazing or for use in sod production.

Although some historical populations have disappeared, the sparrow has been found at four previously unreported locations since it was listed, resulting in a total of seven currently known colonies. Fortunately, the largest known populations are on public lands — the Commission's Three Lakes Wildlife Management Area (Osceola County) and the Air Force's Avon Park Range (Highlands and Polk counties) — and have remained stable. A recent survey of singing birds also detected 14 males on the National Audubon Society's Kissimmee Prairie Sanctuary in Okeechobee County. Assuming an equal sex ratio, the 150 males counted during recent surveys represent a minimum total population of 300 adults. Other colonies may exist on some private ranches where access to researchers is denied.

Habitat requirements include large, open grasslands where saw palmetto *(Serenoa repens)*, wire grass *(Aristida stricta)*, and dwarf oak *(Quercus minima)* provide nesting sites for this sparrow. Frequent prescribed burns by Commission, Air Force, National Audubon Society, and Nature Conservancy land managers keep the vegetation in a low, early successional stage usually associated with greater densities of Florida grasshopper sparrows. Light grazing by cattle at some locations appears to be compatible with the ecological needs of the sparrow. The occurrence of the Florida grasshopper sparrow in some managed pastures and agricultural fields reverting to prairie shows that the bird may be responsive to habitat restoration. Because the cooperation of ranchers is essential to the recovery of this sparrow, the U.S. Department of Agriculture's Soil Conservation Service considers the bird during range management consultations with landowners.

Additional management is required on the Air Force's Avon Park Range. The 166 square mile (430 square kilometer) military installation serves as a training range for fighter aircraft and contains most of the known Florida grasshopper sparrows. Further military efforts to accommodate the sparrow include removal of planted slash pines *(Pinus elliottii)* from occupied prairies and planning Army National Guard maneuvers in ways that avoid jeopardizing the bird. The "impact" of explosions on grasshopper sparrows near targets also is being monitored.

Personnel from the Commission, Air Force, National Audubon Society, and Archbold Biological Station conducted a banding study of this little-known bird from 1989-1992. Seventy-three Florida grasshopper sparrows on the Avon Park Range were captured with mist nets and color-banded for the study. Resightings and recaptures of marked individuals provided some much needed information. Territory size during the breeding season averaged 4.37 acres (1.77 hectares), and population density was 0.02 territory/acre (0.05 territory/ha). Thus, the recovery plan objective of a minimum viable colony of 50 breeding pairs would require over 2,470 acres (1,000 ha) of contiguous habitat.

The relatively high annual survival rate (0.59) and mean longevity (2.9 years) of Florida grasshopper sparrows, together with a high reproductive potential (2-3 broods per year are reported), may facilitate the recovery of populations remaining in good breeding habitat. One individual banded as an adult on April 18, 1989, and resighted on June 28, 1992, exceeded the longevity record for grasshopper sparrows by at least one year[2]. Recaptures during the winter support the assumption that the Florida subspecies is nonmigratory. Prior evidence of a resident population was limited to 2 specimens collected during January 1937[3].

Recovery of the Florida grasshopper sparrow will be possible only if the bird can increase in numbers and range. Although most known populations of this subspecies are on protected lands, most of the available prairie habitat for future populations is on private lands that are vulnerable to conversion. Land use trends indicate continued habitat loss for the sparrow. Data gathered during recent studies, however, will be used to develop strategies for recovery and will enable property owners to make informed resource management choices.

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[1]USFWS. 1988. Recovery Plan for Florida Grasshopper Sparrow. U. S. Fish and Wildl. Serv., Atlanta, Ga. 22 pp.

[2]Klimkiewicz, M. K., and A. G. Futcher. 1987. Longevity records of North American birds: Coerebinae through Estrildidae. J. Field Ornithol. 58:318-333.

[3]U. S. Natl. Mus., Nos. 341353 and 341455.

Michael Delany is a wildlife biologist with the FGFWFC's Wildlife Research Laboratory, Gainesville, Florida.

Listing Proposals — August/September 1994

Fifteen species — 11 animals and 4 plants — were proposed by the Fish and Wildlife Service (FWS) during August and September 1994 for listing as Endangered or Threatened. If the listing proposals are approved, Endangered Species Act protection will be extended to the following:

Seven Southeastern Mussels

The Gulf Slope rivers draining the Appalachicolan Region of southeast Alabama, southwest Georgia, and northern Florida are known for their high levels of species diversity and endemism. They harbor nearly 30 species of endemic freshwater mussels, at least a dozen fishes, over 20 aquatic snails, and nearly two dozen species of crayfish.

Seven of these mussels were proposed on August 3 for listing under the Act. The classification of Endangered was recommended for the five most vulnerable species:

- **fat three-ridge** ***(Amblema neislerii)*** — an inflated mussel with a heavy, dark shell featuring prominent ridges;
- **shiny-rayed pocketbook** ***(Lampsilis subangulata)*** — characterized by a yellowish brown shell with fairly wide, bright emerald green rays;
- **Gulf moccasinshell** ***(Medionidus penicillatus)*** — a small species with a yellowish to greenish-brown, slightly-ridged shell highlighted by fine, interrupted rays;
- **Ochlockonee moccasinshell** ***(Medionidus simpsonianus)*** — another small, slightly-ridged mussel marked with green rays formed by a series of connecting chevrons or undulating lines; and
- **oval pigtoe** ***(Pleurobema pyriforme)*** — a small to medium sized mussel with a shiny, tan to dark brown shell.

Because the other two species in the listing proposal are not in as great a degree of danger, they were proposed for classification as Threatened:

- **Chipola slabshell** ***(Elliptio chipolaensis)*** — a medium sized mussel with a smooth shell that is chestnut in color, and
- **purple bankclimber** ***(Elliptoideus sloatianus)*** — a large, heavily-ridged species about 8 inches (20 centimeters) in length with a dark purple nacre (inner shell lining).

All seven mussels generally occur in clean, free-flowing streams. Their precarious status is the result of widespread habitat modification or destruction. Many stream reaches no longer sustain the mollusks because of such factors as impoundments, channel dredging, agricultural runoff, industrial and municipal waste discharges, and siltation from certain silvicultural practices (clear-cutting and destruction of streamside vegetation).

Two California Butterflies

Two butterfly subspecies in southern California were proposed August 4 for listing as Endangered:

- **Laguna Mountains skipper** ***(Pyrgus ruralis lagunae)*** — a small, mostly white butterfly inhabiting wet, montane meadows within a very restricted range in San Diego County; and
- **quino checkerspot** ***(Euphydryas editha quino)*** — a small butterfly checkered with dark brown, reddish, and yellow spots. This subspecies is endemic to sunny openings on clay soils within chaparral and coastal sage shrublands of southwestern California and northwestern Baja California, Mexico. Historically, it also was found in open grasslands.

Both butterflies have declined significantly in numbers and range due to habitat damage resulting from urban, agricultural, and recreational development. The primary factors in the decline of the Laguna Mountains skipper, however, were overgrazing, vegetative changes due to fire suppression, and trampling by cattle of its larval food plant, *Horkelia clevelandi.* Grazing and subsequent replacement of native vegetation by non-native plants also have damaged stands of *Plantago erecta*, the host plant for quino checkerspot larvae. The ranges of both butterfly subspecies are determined largely by the presence of these food plants, although other physiological or ecological constraints may further restrict the butterflies.

Overcollecting and deliberate destruction of habitat are additional threats. Butterfly collectors who specialize in rare species have caused the loss of some quino checkerspot colonies. Additionally, the habitat of the largest and most dense quino checkerspot population in Riverside County was destroyed in the 1980's for the purpose of eliminating the butterflies.

Arkansas River Shiner *(Notropis girardi)*

As its "common" name indicates, this small, heavy-bodied minnow is endemic to the Arkansas River and its tributaries in Arkansas, Texas, Oklahoma, Kansas, and New Mexico. But the Arkansas River shiner is no longer common; this historically widespread and abundant fish has been eliminated from over 80 percent of its historical range. Remnant populations are restricted primarily to a portion of the South Canadian River

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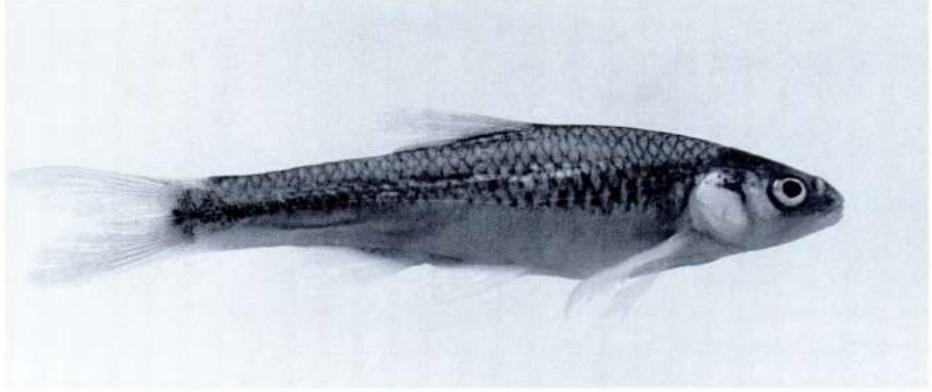

photo © R.L. Mayden

Arkansas River shiner

Listing Proposals

(Continued from previous page)

(an Arkansas River tributary) in Oklahoma, Texas, and New Mexico.

The Arkansas River shiner is adapted to life in the main channels of wide, shallow, sandy-bottomed rivers and streams. Most of its historical habitat has been channelized, inundated by impoundments, or desiccated by water diversions and excessive groundwater pumping. Competition from an introduced fish, the Red River shiner *(Notropis bairdii)*, also may have contributed to the decline of the Arkansas River shiner.

The FWS proposed August 3 to list the Arkansas River shiner as Endangered. This proposal, however, does not cover a non-native population that has become established in the Pecos River in New Mexico, presumably originating from the release of bait fish collected from the species' native range. Protection of this artificial population would conflict with efforts to manage native fish populations in the Pecos River.

San Diego Fairy Shrimp *(Branchinecta sandiegoensis)*

A small and delicate freshwater crustacean, the San Diego fairy shrimp occurs at 11 locations in San Diego County, California, and 2 in northwestern Baja California. Nine of these populations are declining because of habitat degradation.

The vernal pools that support the San Diego fairy shrimp and other endemic animals and plants form in regions with a Mediterranean climate where depressions underlain with an impervious soil layer fill with water after fall and winter rains. These seasonal wetlands then dry slowly during the spring and summer. The cyclic wetting and drying create an unusual ecological situation supporting a unique biota. Many animals and plants are adapted specifically to this environment and cannot survive if it is altered or lost. Fairy shrimp adaptations include eggs that can survive heat, cold, and dry conditions until the pools fill again in the fall.

Vernal pools are considered fragile, easily disturbed ecosystems. One study found that, in San Diego County, more than 97 percent of historical vernal pool habitat had been lost by 1986. Although it is uncertain how many of these pools were inhabited by the San Diego fairy shrimp, several sites known to have supported the species have been degraded or destroyed. Most of the remaining habitat is vulnerable to damage by urban and agricultural development, mowing and livestock grazing, streambed channelization, off-road vehicle use, trash dumping, and invasions of weedy, non-native plants. Because of these continuing threats, the FWS proposed August 4 to list the San Diego fairy shrimp as Endangered.

Two California Plants

Endangered Species Act protection was proposed August 4 for two plant subspecies native to the Peninsula Ranges of southwestern California:

- **Cuyamaca Lake downingia *(Downingia concolor* var. *brevior)*** — a low-growing annual herb in the bellflower family (Campanulaceae) with blue and white flowers. Its seeds are dispersed by flooding and require brief inundation to germinate. Because the entire population exists solely in the Cuyamaca Valley area, this plant was proposed for listing as Endangered.
- **Parish's meadowfoam *(Limnanthes gracilis* ssp. *parishii)*** — an annual in the family Limnanthaceae with white or cream-colored, bowl-shaped flowers. This plant also requires saturated soils or inundation to promote germination. Fewer than 20 populations are known. Because the meadowfoam is vulnerable but not in immediate danger of extinction, it was proposed for listing as Threatened.

Both plants grow only in moist soils, near springs or seeps, or in vernal pools — wetlands that are disappearing rapidly in southern California. Factors implicated in the decline of the San Diego fairy shrimp threaten the Cuyamaca Lake downingia and Parish's meadowfoam include hydrological alterations, grazing, recreational activities, and invasions of weedy species.

Spring Creek Bladderpod *(Lesquerella perforata)*

A rare plant in the mustard family (Brassicaceae), the Spring Creek bladderpod is restricted to central Tennessee, where it grows along a limited number of streams. Habitat alteration has eliminated this species from several historical locations and threatens the remaining sites. Only four populations remain, all in Wilson County. On August 23, the FWS proposed to list this species as Endangered.

The Spring Creek bladderpod is a winter annual that germinates in the early fall, over-winters as a small rosette of leaves, and produces white to lavender flowers the following spring. Soon after the flowers wither, the fruits mature and the plant dies. The seeds fall to the ground and lie dormant until the fall, when the cycle begins again. This species typically grows on floodplains and requires annual disturbance to complete its life cycle. Historically, the needed disturbance was provided by periodic flooding that removed competing perennial grasses and woody plants.

As a result of flood control measures, woody vegetation has encroached on some Spring Creek bladderpod sites. However, the cultivation of annual crops such as corn is an excellent means of artificially maintaining the habitat, provided that there is no fall plowing and that herbicide use is limited. The direct destruction of habitat for commercial, residential, or industrial development is the most significant threat to the bladderpod at this time.

Eggert's Sunflower *(Helianthus eggertii)*

Another rare plant from Tennessee, as well as Kentucky and Alabama, is Eggert's sunflower. This perennial in the aster family (Asteraceae) typically grows in open fields and along woodland borders where it receives full sun or only partial shade.

Some of the species' former sites have been lost to development or converted for agricultural uses. Vegetational suc-

(Continued on page 12)

Final Listing Rules — September/October 1994

Final rules adding 24 species — 16 plants and 8 animals — to the U.S. List of Endangered and Threatened Wildlife and Plants were published by the Fish and Wildlife Service in September and October 1994. These plants and animals now receive Endangered Species Act protection, and plans will be developed for their recovery. A list of the newly added taxa, with their legal classifications and *Federal Register* publication dates, follows:

PLANTS

Five California Plants

Five plant taxa endemic to carbonate deposits in the San Bernardino Mountains of southern California were listed August 24. One was listed as Threatened:

• **Parish's daisy** ***(Erigeron parishii)*** — a small perennial herb in the aster family (Asteraceae).

Because the other four are in more immediate danger of extinction, they were listed as Endangered:

• **Cushenbury buckwheat** ***(Eriogonum ovalifolium*** **var.** ***vineum)*** — a low, densely-matted perennial in the buckwheat family (Polygonaceae);

• **Cushenbury milk-vetch** ***(Astragalus albens)*** — a small, silvery-white perennial herb in the pea family (Fabaceae);

• **San Bernardino Mountains bladderpod** ***(Lesquerella kingii*** **var.** ***bernardina)*** — a silvery, short-lived perennial in the mustard family (Brassicaceae); and

• **Cushenbury oxytheca** ***(Oxytheca parishii*** **var.** ***goodmaniana)*** — a wiry annual in the buckwheat family.

Four Hawaiian Ferns

Four species of ferns endemic to the Hawaiian Islands were listed September 26 as Endangered:

• ***Asplenium fragile*** **var.** ***insulare*** — a short-stemmed fern in the spleenwort family (Aspleniaceae);

• ***Ctenitis squamigera*** — a densely scaled fern in the spleenwort family, known in Hawaiian as pauoa;

• ***Diplazium molokaiense*** — a short, prostrate fern, also in the spleenwort family; and

• ***Pteris lidgatei*** — an herb in the maidenhair family (Adiantaceae).

Tetramolopium capillare

This Hawaiian plant, a sprawling shrub in the aster family, was listed separately on September 30 as Endangered. It is known in the Hawaiian language as pamakani.

Three Puerto Rican Plants

Three plant species native to the island of Puerto Rico were listed September 9 as Endangered:

• ***Mitracarpus maxwelliae*** — a low, densely-branching shrub in the family Rubiaceae;

• ***Mitracarpus polycladus*** — a related shrub also found on the island of Saba in the Lesser Antilles; and

• ***Eugenia woodburyana*** — a small evergreen tree in the myrtle family (Myrtaceae).

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Listing Proposals

(Continued from page 11)

cession, however, may be the most significant threat. Because of its intolerance of full shade, Eggert's sunflower depends on periodic disturbance to maintain the open nature of its habitat. Historically, disturbance was provided by wildfires, which eliminated competing vegetation. Due to fire suppression, the sunflower now is found most often in habitats that only mimic its ecological requirements. These sites typically are disturbed habitats such as roadside rights-of-way, ditches, and roadcuts. But unless periodic mowing, burning, or vegetation thinning is employed to control the growth of woody plants, Eggert's sunflower cannot survive indefinitely even in such locations.

Photo by R. L. Jones

Eggert's sunflower grows to about 8 feet (2.5 meters) in height and bears large yellow flowers.

At present, Eggert's sunflower is known to exist at only 24 locations within 13 counties in Tennessee, Kentucky, and Alabama. Fifty-eight percent of these populations are threatened by habitat modification or destruction. Accordingly, on September 9, the FWS proposed listing this species as Threatened.

Final Listing Rules

(Continued from previous page)

Two Texas Plants

Two plants from southern Texas were listed August 24 for listing as Endangered:

- ***Texas ayenia (Ayenia limitaris)*** — a subshrub in the cacao family (Sterculiaceae), and
- **south Texas ambrosia *(Ambrosia cheiranthifolia)*** — an herbaceous perennial in the aster family (Asteraceae).

Western Lily *(Lilium occidentale)*

This perennial in the family Liliaceae produces attractive red flowers. One of the three rarest lilies in the United States, it has an extremely restricted distribution near the Pacific Coast in southern Oregon and northern California.

ANIMALS

Four Freshwater Shrimp

Four species of freshwater shrimp native to California's Central Valley were listed September 19. The three most imperiled species were classified as Endangered:

- **Conservancy fairy shrimp *(Branchinecta conservatio)*,**
- **longhorn fairy shrimp *(Branchinecta longiantenna)*, and**
- **vernal pool tadpole shrimp *(Lepidurus packardi).***

Although vulnerable, the fourth species is not in as much immediate danger, and therefore was listed as Threatened:

- **vernal pool fairy shrimp *(Branchinecta lynchi).***

All four species are small crustaceans that inhabit vernal pools, an unusual type of ephemeral wetland. Fairy shrimp have delicate, elongate bodies, stalked compound eyes, no carapace, and 11 pairs of swimming legs. Tadpole shrimp have dorsal compound eyes and a shield-like carapace covering most of the body.

Two Puerto Rican Hawks

Two subspecies of hawks restricted to forested mountains on the island of Puerto Rico were listed September 9 as Endangered:

- **Puerto Rican broad-winged hawk *(Buteo platypterus brunnescens)*** — small, dark brown hawk with a black-and-white banded tail and rufous breast.
- **Puerto Rican sharp-shinned hawk *(Accipiter striatus venator)*** — a small, dark gray hawk with heavily-barred rufous underparts.

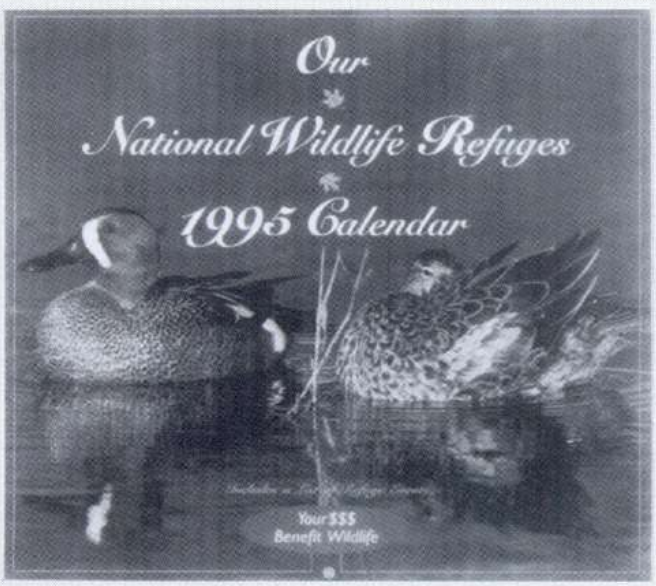
White Sturgeon *(Acipenser transmontanus)*

The Kootenai River population of the white sturgeon was listed September 6 as Endangered. This action applies to white sturgeon within a distinct 168 mile (270-kilometer) stretch of the Kootenai River in Idaho, Montana, and British Columbia, Canada. Since 1974, soon after Libby Dam in Montana began operation, few if any juvenile white sturgeon have been added to this population.

Pacific Pocket Mouse *(Perognathus longimembris pacificus)*

One of the smallest rodents in the world, the Pacific pocket mouse reaches only up to 5.2 inches (131 millimeters) from nose to tip of tail. The only population known to remain inhabits less than 4 acres (1.6 hectares) on the Dana Point Headlands in Orange County, California. Because of threats posed by development and free-roaming cats, this subspecies was listed September 29 as Endangered.

1995 Refuge Calendar Available



The 1995 *Our National Wildlife Refuges* calendar by natural history photographers John and Karen Hollingsworth is now available.

Highlighting the diversity of wildlife and habitats within the National Wildlife Refuge System, the calendar includes a list of refuge events nationwide, such as festivals, fishing derbies, and prime times to see certain migratory species.

As before, for every calendar purchased, 50 cents will be donated to the National Fish and Wildlife Foundation, which will match these donations fully. The funds will be used for habitat restoration and environmental education projects on refuges.

To order the calendar, send $15 (shipping and handling included) to: Reflections of Nature, P.O. Box 235, Bellvue, Colorado, 80512-0235, or call 1-800-493-2713 (VISA and Mastercard accepted).

The Hollingsworths also recently published a book entitled *Seasons of the Wild - A Journey through Our National Wildlife Refuges with John & Karen Hollingsworth.* With more than 70 photographs, the book features 47 national wildlife refuges. A portion of the proceeds from sales of the book also will go to the Foundation. The book can be ordered from Reflections of Nature for $19.95.

Recovery Updates

The recovery of imperiled plants and animals to a secure status in the wild is the ultimate goal of the Fish and Wildlife Service's endangered species program. Because of the growing interest in species recovery, we recently created a new Recovery Updates section. The recovery news is arranged by region, and we encourage all offices to bring their success stories to light.

Region 1

• **San Joaquin Valley Multi-Species Recovery Planning** —Staff from the Fish and Wildlife Service (FWS) Sacramento, California, Field Office met with the San Joaquin Valley Endangered Species Recovery Planning Program staff to discuss the status of an effort to create a multi-species recovery plan for the valley. Information has been collected from numerous data sources in the field and preliminary population viability analyses (PVA) have been done for a number of species. PVA results should aid in the development of models for analyzing the effects of different preserve designs on species recovery.

• **'Alala** ***(Corvus hawaiiensis)*** — Following a successful season of manipulating wild 'alala (Hawaiian crow) nests, five chicks of this severely endangered species were hatched and reared at a temporary incubation facility on the island of Hawai'i (the "Big Island"). Record success at the captive breeding facility on Maui also produced four 'alala chicks this year, which were swapped recently with two from the Big Island. The seven chicks now on the Big Island have been transferred to the field aviary adjacent to the wild 'alala territories and are scheduled for release shortly.

Four of the chicks that hatched last year are progressing well and have been observed foraging for fruit on trees growing within the aviary; however, the fifth bird has disappeared and is feared dead.

• **Pahranagat Valley Species Recovery Plan** — The FWS Reno, Nevada, Field Office issued a draft recovery plan for aquatic and riparian species of Pahranagat Valley to the Portland Regional Office on August 15. This plan incorporates an ecosystem approach to recovery by addressing the recovery needs of three Endangered fish species and nine listing candidates. Reno staff also met with private landowners in the Pahranagat Valley to discuss cooperative ways to restore riparian habitat and enhance aquatic habitat.

Region 2

• **Kemp's ridley sea turtle** ***(Lepidochelys kempii)***—The FWS National Sea Turtle Coordinator's Office in the Albuquerque Regional Office, in cooperation with the Gladys Porter Zoo in Brownsville, Texas, works with the Instituto National de Pesca, Secretaria de Pesca, Mexico, to save one of the most imperiled animals in the world: the Kemp's ridley sea turtle. For 17 years, Mexico, the FWS, and the zoo jointly have protected nesting female turtles, their eggs and hatchlings, and crucial nesting habitat. This project often has been identified as one of the best examples of international cooperation for the conservation and recovery of an endangered species.

The Kemp's ridley normally nests at only one spot on earth: Playa Rancho Nuevo on northern Mexico's Gulf Coast. By November 1, 1994, the eggs from 1,568 nests had been collected for incubation in protected corrals. This is the best year on record for the recovery project. In 1994, we encountered more than twice the number of nests seen in 1985 (the year with the fewest nests), and project biologists released about 120,000 viable hatchlings into the Gulf. In each of the last few years, 50,000 to 80,000 hatchlings were released annually into the wild. Typically, however, only a small percentage of hatchlings survive into adulthood.

The increase in the number of Kemp's ridley nests is due to the protection given the nesting area each year. Biologists also are optimistic that the acceptance and use of turtle excluder devices (TEDs) in the U.S. and Mexican shrimp fleets will greatly enhance the recruitment of turtles into the adult breeding population. If all shrimp boats use TEDs in their nets *and* fish with them properly, the number of turtles that escape shrimping trawls and return to the breeding beach may increase exponentially.

Despite the optimism about the increases, the Kemp's ridley is by no means in the clear. Recent successes are overshadowed by the fact that, less than 50 years ago, 40,000 nesting females

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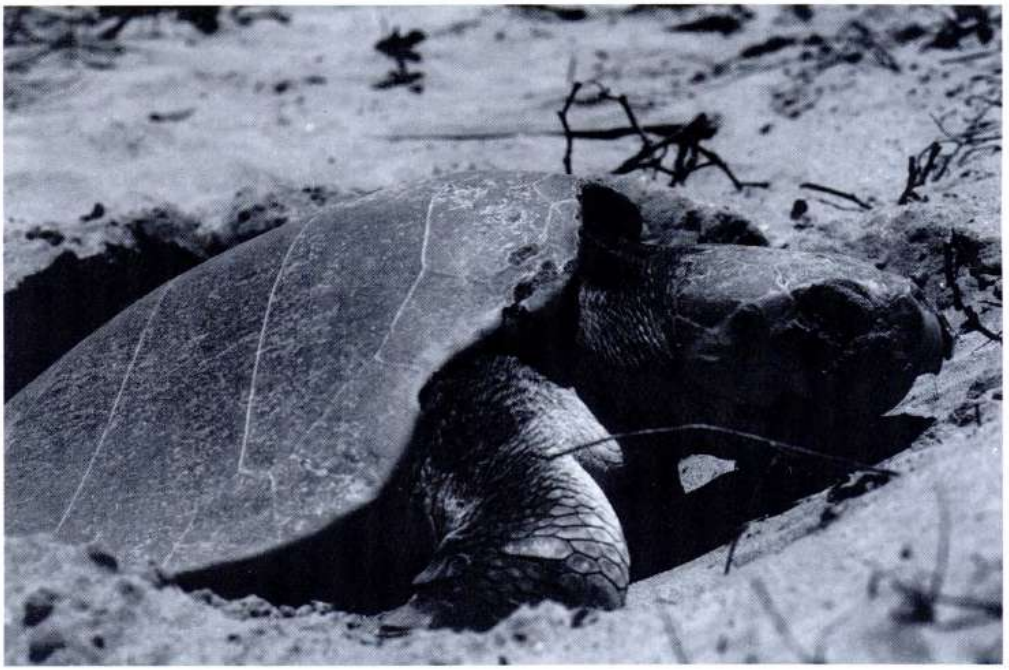

FWS photo

Kemp's ridley sea turtle

Recovery Updates

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were seen at the nesting beach in a 4-hour period. Recent heavy mortalities on Texas beaches during the shrimping season have been discouraging. Protection of the sole nesting area and support for active enforcement of the National Marine Fisheries Service TED regulations are essential if recovery is to be achieved.

• **Mexican wolf** ***(Canis lupus baileyi)*** —Twenty-one Mexican wolf pups were born during the 1994 breeding season. Fifteen survived as of August 1, 1994, bringing the current population of *lobos* to 90.

The entire known population of Mexican wolves exists in captive breeding facilities at 15 sites in the U.S. and 5 in Mexico. The American Zoo and Aquarium Association recently included the Mexican wolf in its "Species Survival Plan" (SSP) program, which seeks to preserve the world's rarest species through carefully managed captive breeding. Dave Parsons, the FWS Mexican Wolf Recovery Coordinator, met in July with representatives from cooperating captive management facilities to discuss the SSP, and to plan for next year's wolf breeding program.

The FWS is drafting a proposal to reintroduce Mexican wolves to two sites: the White Sands Missile Range in south-central New Mexico and the Blue Range Area in the Apache-Sitgreaves National Forest of southeastern Arizona. A Draft Environment Impact Statement (EIS) is being prepared, and is targeted for release to the public in February 1995. Wendy Brown, a wildlife biologist hired in May 1994 to work full time on Mexican wolf recovery, will coordinate an extensive outreach effort throughout the EIS process. She also is developing surveys to determine if any wild Mexican wolves remain along the U.S./Mexico border. A similar survey effort, led by Dr. Julio Carrerais, is under way in Mexico.

The FWS also plans to build a Mexican wolf captive management facility at the Sevilleta National Wildlife Refuge in New Mexico. It will be used for holding and breeding Mexican wolves and, if the reintroduction proposal is approved, for initial acclimation of captive-bred animals for release into the wild.

Region 3

• **Kirtland's warbler** ***(Dendroica kirtlandii)*** —Recovery efforts in Michigan for this Endangered bird are showing impressive results. In early June, census takers counted a record 633 singing males, up from 485 in 1993 and a low of 167 recorded in 1987.

Cooperative habitat management efforts by the FWS, U.S. Forest Service, and Michigan Department of Natural Resources are providing nesting sites for the bird. Additionally, the FWS East Lansing, Michigan, Field Office has been coordinating the control of brown-headed cowbirds *(Molothrus ater),* which parasitize the nests of warblers and other birds. More than 3,100 cowbirds were removed from warbler breeding areas in 1994.

Recovery team members and others concerned about the warbler are scheduled to meet again in February 1995 to discuss next year's habitat management plans on State and Federal lands. The survival of the Kirtland's warbler will depend on continued cowbird control as well as intensive habitat management.

• **purple cat's paw pearly mussel** ***(Epioblasma obliquata obliquata)*** — Under contract to the Ohio Division of Wildlife, Dr. Micheal Hoggarth recently discovered a new population of this Endangered mollusk in Killbuck Creek of Coshocton County, Ohio. The wide age diversity he found indicates that the population is reproducing. This represents the "malacological find the century" in Ohio because the Killbuck Creek population may be the largest, and only reproducing, purple cat's paw population remaining anywhere. The FWS Reynoldsburg, Ohio, Field Office is moving quickly with the State to determine the population's size and range, and to secure its protection.

Region 5

New populations of several rare New England plants and animals have been discovered recently, making 1994 a banner year for endangered species in the region.

• **northeastern beach tiger beetle** ***(Cicindela dorsalis dorsalis)*** — In Massachusetts, a mainland site for this Threatened insect has been rediscovered near Westport, one of the State's five known historical locations. Until this summer, the only population known to remain in New England occurred on the island of Martha's Vineyard.

Once described as occurring in "great swarms" along beaches from Massachusetts to New Jersey, the northeastern beach tiger beetle has been extirpated from New Jersey, New York, Connecticut, and Rhode Island. It remains relatively well established only in the Chesapeake Bay area. The species needs a beach ecosystem that is highly dynamic, subject to natural erosion and accretion processes, and undisturbed by heavy human use. As a result of intense coastal development, shoreline stabilization, and recreational uses, this type of beach habitat has been reduced seriously along much of the Atlantic and Gulf coasts, particularly in the northeast.

Northeastern beach tiger beetles are predatory at both their adult and larval stages. Adults are active on warm, sunny days along the water's edge, where they use their long, sickle-like mandibles to capture such prey as amphipods and flies and to scavenge on crab and fish carcasses. On the other hand, larvae are "sit-and-wait" predators, digging burrows in the sand and waiting at the burrow mouth to capture passing amphipods.

• **dwarf wedge mussel** ***(Alasmidonta heterodon)*** — A new population was discovered by a graduate student during an inventory of freshwater mussels in southern New Hampshire. It appears to be one of the better populations for this Endangered mollusk, although it is limited to a short stretch of river.

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Recovery Updates

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• **sandplain gerardia** ***(Agalinis acuta)*** — Prospects for this Endangered plant brightened when a new population was discovered in Massachusetts by a student intern working for The Nature Conservancy. Previously known from 49 sites in the northeast, only 11 populations are known today. The two other known Massachusetts sites are in small cemeteries at Cape Cod dating back to the 1700's, where mowing has maintained the grasslands supporting the gerardia.

An annual herb growing up to about 12 inches (30 centimeters) tall, the sandplain gerardia produces individual purple or pink flowers that last a single day. This species typically grows in dry, sandy, nutrient-poor soils of sparsely vegetated sandplain environments and serpentine barrens. Such harsh conditions may eliminate potentially competitive species. The most significant threat to the sandplain gerardia is degradation or loss of habitat.

• **northeastern bulrush** ***(Scirpus ancistrochaetus)*** — State, Federal, and contract biologists have discovered four additional populations, two in New Hampshire and two in Vermont. A member of the sedge family, this wetland species typically is found in ponds, wet depressions, or shallow sinkholes within small wetland complexes characterized by seasonally variable water levels. Threats to its survival include habitat loss and degradation caused by wetland draining, dredging, and filling for residential and agricultural development. Very little is known about the life history and reproductive biology of the northeastern bulrush.

• **Michaux' sumac** ***(Rhus michauxii)*** — Until recently, surviving populations of Michaux' sumac were known only from North Carolina and one site in Georgia. Not even historical records existed for this plant in Virginia. But a recent discovery at Fort Pickett, an Army base in Virginia, located what is now the species' largest known population, containing over 21,000 plants.

Very few of the previously known populations produce fruit. In contrast, the Fort Pickett population is prolific. The Army is taking advantage of the situation by promoting the recovery of Michaux' sumac with vigor. Recovery activities planned or under way include additional surveys, habitat protection, and genetic studies to determine if hybridization occurs between *R. michauxii* and the common smooth sumac *(Rhus glabra)*. A Global Positioning System is being used to record species locations into a Geographic Information System. Graduate studies are planned to determine levels of seed germination and viability, and the feasibility of propagating and transplanting Michaux' sumac to establish or augment populations. The Army also plans to set up and monitor prescribed burning plots to determine the best habitat management strategy for this species.

Regional News

(Continued from page 2)

FWS Reno, Nevada, Field Office staff recently accompanied representatives from the Nevada Natural Heritage Program, Nevada State Museum, and developers of the Shaheen Business Park to the only known habitat of the Carson wandering skipper *(Pseudocopaeodes eunus* ssp.*)* in Carson City, Nevada. The butterfly's habitat is a wetland located adjacent to land being developed for the business park. The developers have expressed a willingness to purchase the entire habitat (they now own about half) and donate it to The Nature Conservancy. This action, which is intended to serve as mitigation for a proposed wetland fill, should also serve to protect the wandering skipper at the site.

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Staff from the FWS Ventura, California, Field Office and the National Biological Survey recently conducted a survey of southern sea otters *(Enhydra lutris nereis)* on San Nicolas Island, where the FWS has attempted to establish a population of this Threatened marine mammal. Eight mature sea otters and two pups were found. Unusually dense kelp beds and fair to poor viewing conditions were noted throughout the survey period. Sea otter populations at San Nicolas Island have been relatively stable for the past 4 years.

*****

Region 3 — The Karner blue butterfly *(Lycaeides melissa samuelis)* and its host plant, wild lupine *(Lupinus perennis)*, occur at about 130 locations in Wisconsin. Together, these site comprise the butterfly's largest known remaining concentration. Much of the habitat, however, is on public or private land managed for timber production. Because some forestry activities, such as pesticide applications and tree planting, may have adverse effects on the butterfly, the Wisconsin Department of Natural Resources has entered into a statewide habitat conservation planning process with representatives of the forest industry. The State hopes to expand the partnership to other private and public landowners. The Habitat Conservation Plan will be a key component in a permit application for "incidental take" of the Karner blue butterfly.

*****

Region 4 — The FWS recently initiated a civil penalty proceeding against a Melbourne, Florida, condominium association for violations of the Endangered Species Act resulting from use of beach lighting that allegedly caused sea turtle disorientation and deaths.

Most sea turtle species hatch at night. When they emerge from their nests in the sand, the hatchlings instinctively head for the lightest horizon. Normally, the lightest point would be the reflection of moonlight on the ocean, which would guide the hatch-

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FWS photo

loggerhead sea turtle hatchling

Regional News

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lings to the water. Artificial lighting along nesting beaches can disorient the hatchlings, leading them to crawl away from the ocean and into danger. They then become vulnerable to cars, predators, and desiccation.

The condominium association was served a Notice of Violation for high sea turtle mortality on three separate nights caused by the facility's outdoor lighting near a nesting beach. The notice proposed a civil penalty of $15,000 each for three alleged Endangered Species Act violations. Prior to this action, the association had received several warnings that it was violating Brevard County's lighting ordinance and that the lighting was likely to result in the death of protected sea turtles. The association failed to heed the recommendations to correct its lighting problem.

Since receiving the Notice of Violation, the association has installed shields on the problem lights, bringing them into compliance with the Brevard County lighting ordinance. It also is encouraging residents to turn off any exterior lighting on their beachside balconies and to close blinds and draperies in oceanfront rooms at night from May 1 to October 31 of each year.

For information about the impacts of lighting on sea turtles, contact the Sea Turtle Recovery Coordinator, U.S. Fish and Wildlife Service, 6620 Southpoint Drive, South, Suite 310, Jacksonville, Florida 32216-0912, telephone 904/232-2580.

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Region 5 — Michael Amaral, Endangered Species Specialist with the FWS New England Field Office, recently guided a team of animal damage control specialists from the U.S. Department of Agriculture (USDA) and the New Hampshire Fish and Game Department through an important Karner blue butterfly site in Concord, New Hampshire. Last June, deer and woodchucks browsed more than half of the site's lupine blossoms, reducing a critical butterfly nectar source. After the visit, USDA agreed to assume the lead in preparing an animal damage control plan for the 2-acre (0.8 hectare) site. The plan likely will call for woodchuck control and an electric fence for deer.

*****

The Ohio River Islands National Wildlife Refuge encompasses a chain of islands and surrounding aquatic habitat spread over 360 river miles (580 kilometers) in Pennsylvania, West Virginia, and Kentucky. Among the resources of management concern within the refuge are over 40 species of native freshwater mussels, including 2 Endangered species: the pink mucket pearly mussel *(Lampsilis abrupta)* and the fanshell mussel *(Cyprogenia stegaria).*

Diving is required to effectively assess and monitor the mussel communities in the Ohio River ecosystem, where mussels inhabit waters up to 35 feet (10.7 meters) or more in depth. Hiring SCUBA diving contractors is expensive, over $600 per day per diver, and it takes considerable time to orient even

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experienced divers in conducting mussel studies in riverine environments. To ensure that necessary studies can be accomplished within available funds, three refuge staff members (Mitch Ellis, Patricia Morrison, and Janet Butler) have been trained and certified as SCUBA divers. Following 2 years of planning and coordination with the National Biological Survey and U.S. Geological Survey, the new FWS Dive Team was approved by the Region 5 Regional Office as a pilot program.

In the future, refuge staff will team with members of the FWS Ecological Services Office in Elkins, West Virginia, to form a larger dive team specializing in freshwater mussel work within the Ohio River ecosystem. This in-house SCUBA diving capability will enable the team to provide diving services for other FWS stations that need underwater investigations. For details, contact Assistant Manager Mitch Ellis at Ohio River Islands NWR, P. O. Box 1811, Parkersburg, West Virginia 26102-1811, (304) 422-0752, or via CC-Mail at R5RW_OHRINWR.

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Region 6 — The Virgin River in southwestern Utah is home to two endangered fish species, the Virgin River Chub *(Gila robusta semidnuda)* and the woundfin *(Plagopterus argentissimus)*. A third fish species inhabitating this river is the Virgin spinedace *(Lepidomeda mollispinis mollispinis)*, which was proposed for listing in May 1994. Reduced flows caused by water development projects have had serious impacts on all three species. One water project that may have had significant adverse impacts is the Quail Creek Dam. FWS officials have indicated that the minimum flow rate established in the biological opinion for the dam is not being met by the Washington County Water Conservancy District, and that the available water may not be sufficient for maintenance or recovery of the Virgin River chub. Accordingly, FWS has requested that the Bureau of Land Management reinitiate Section 7 consultation on operation of the dam.

*****

Region 7 — For years, FWS officials in Alaska have been concerned about the rate of logging in southeast Alaska's Tongass National Forest and its effects on wildlife resources, including the Alexander Archipelago wolf *(Canis lupus ligoni)*, Queen Charlotte goshawk *(Accipiter gentilis laingi)*, and marbled murrelet *(Brachyramphus marmoratus)*. The Tongass, at nearly 17 million acres (6.9 million hectares), is our largest National Forest. It is a mosaic of glaciers, mountains, fjords, and islands within one of the largest remaining temperate rainforests on earth.

Large-scale logging began on the Tongass during the mid-1950's to support two pulp mills in Ketchikan and Sitka. The mills were established under 50-year contracts to create a relatively stable, year-round economy in a remote region that was dependent on seasonal industries such as fishing and tourism. The Sitka mill closed this year because of financial difficulties; consequently, its contract was terminated by the U.S. Forest Service. The Ketchikan Pulp Company contract remains effective until 2004.

The primary method of timber harvest in southeast Alaska has been clearcut logging. This method converts uneven-aged mature forest into even-aged timber stands so dense that, after about 30 years, little understory vegetation — critical to many wildlife species — can persist. Old-growth forest conditions require 200 years to return. However, the current planned rotation for timber harvest in the Tongass is 90-125 years. Thus, under this schedule, vast areas of the forest will never return to old- growth conditions.

In response to increased concerns for the Tongass and its diverse resources, the FWS, Forest Service, and Alaska Department of Fish and Game are working to establish a cooperative interagency protocol for the forest. The aim is to minimize or avoid the need to list Tongass species under the Endangered Species Act. Considering the widely divergent views on how the forest should be managed, this is an ambitious goal. The agencies agree that change is needed and that implementing changes will be difficult.

*****

The Eskimo curlew *(Numenius borealis)* is the most endangered long distance migrant in the world. This bird nests in northwestern Canada and perhaps northern Alaska, and flies as far south as the region of Patagonia in South America. Through Conservation International, the FWS has funded two studies of the Eskimo curlew in its Central and South American migration and wintering sites.

The objective of the first project was to locate Eskimo curlews by intensive searches of historically occupied wintering habitats. Forty ornithologists searched Argentina and Uruguay during the winter of 1992-1993. They found concentrations of associated grassland shorebirds, but no Eskimo curlews.

The second project involved a search of Spanish and Portuguese literature in South America, museum skins, and other informational sources. It appears that the birds historically spent the middle of the nonbreeding season (November and December) in the southern pampas or in Patagonia, returning to the northern pampas of Argentina in January-February. Extensive areas of grassland habitat remain in Argentina today, and shorebirds associated with the curlew are still common.

Wolf Reintroduction Approved

(Continued from page 1)

Interstate 15 and south of the Missouri River. The central Idaho experimental population area includes portions of Idaho south of Interstate 90 and west of Interstate 15. It also includes a corner of Montana south of Interstate 90 from the Idaho border eastward to Missoula, and west of Highway 93 as it runs south from Missoula.

The current FWS wolf management program in the northern Rocky Mountains allows the agency to move or kill the occasional wolf that preys on livestock, and that program will continue. In addition, the rules will allow private property owners and livestock owners with grazing leases on public land to "harass" wolves without injuring them to discourage conflicts with domestic animals, but will also require those owners to report such incidents within 7 days. On private property within the experimental areas, landowners can kill wolves in the act of wounding or killing livestock, but are required to report the incident within 24 hours, and physical evidence of the attack will be required. Killing wolves on public land by private citizens will require a permit and will be an option only after attempts to relocate problem wolves have ended.

The FWS will establish wolf populations by reintroducing wild gray wolves from Alberta and British Columbia, Canada, where they are not endangered. Over the next 3 to 5 years, about 30 wolves annually (15 for each site) would be captured in Canada in November and December, with approval of the Canadian Wildlife Service, and released in Yellowstone National Park and on U.S. Forest Service lands in central Idaho.

Two different release methods are planned. In Yellowstone, three family groups (adults and their offspring) will be placed in separate 1-acre enclosures to allow them to acclimate to the area within the park. After about 4 to 6 weeks, they will be radio-collared and released. Biologists will track their movements and provide supplemental feeding if necessary. This release technique is designed to encourage released animals to remain in or near the park.

The releases in central Idaho will consist of about 15 adult wolves from various packs. They will be fitted with radio collars and freed as soon as possible after arriving at the release site. This technique, which does not include an acclimation period, is planned for central Idaho because the remote release site's rough terrain makes access difficult for program biologists. In addition, biologists believe the region's steep topography will help keep wolves within the release area. After becoming oriented to the area, the released wolves are expected to behave as naturally occurring wolves. They are expected to disperse, find mates, and form packs, primarily within the 12 million acres of national forest land in central Idaho.

The final rules reflect the recommendation outlined in a final environmental impact statement (EIS) on wolf reintroduction in Yellowstone and central Idaho completed earlier this year by the FWS. The EIS explored options for wolf reintroduction in order to promote the recovery of the gray wolf in the northern Rocky Mountains.

photo by John and Karen Hollingsworth

Gray wolves were common in the northern Rocky Mountains prior to 1870. As human settlement intensified, however, prey species such as deer, elk, and bison declined. With the wolves' natural prey depleted, settlers and government trappers feared that hungry wolves would turn to livestock. Successful campaigns to exterminate wolves in the Rocky Mountain area soon followed.

Populations of natural prey animals have since rebounded. While it is generally agreed that wolves could have eventually repopulated the Yellowstone and central Idaho ecosystems on their own, the process could have taken decades to occur. If wolves reestablished themselves naturally, they would have received the full protection of the Endangered Species Act, with significantly less management flexibility than allowed by the experimental population approach. Under the reintroduction plan, wolf populations are expected to recover by 2002.

Complete details of the rules are found in the November 22, 1994 *Federal Register.*

Almost 500 comments were received on the August 16, 1994, proposed rules, and public hearings were held in Cheyenne, Wyoming; Helena, Montana; Boise, Idaho; Salt Lake City, Utah; Seattle, Washington; and Washington, DC.

For more information, contact the U.S. Fish and Wildlife Service, P.O. Box 8017, Helena, Montana 59601; 406/449-5202.

BOX SCORE
LISTINGS AND RECOVERY PLANS

Category	ENDANGERED U.S.	ENDANGERED Foreign Only	THREATENED U.S.	THREATENED Foreign Only	LISTED SPECIES TOTAL	SPECIES WITH PLANS
Mammals	56	251	9	22	338	39
Birds	75	153	16	0	244	73
Reptiles	16	63	19	14	112	31
Amphibians	6	8	5	0	19	10
Fishes	65	11	38	0	114	66
Snails	14	1	7	0	22	29
Clams	50	2	6	0	58	42
Crustaceans	14	0	3	0	17	4
Insects	19	4	9	0	32	17
Arachnids	4	0	0	0	4	0
Plants	402	1	86	2	491	208
TOTAL	721	494	198	38	1,451 *	526 **

Total U.S. Endangered 721 (319 animals, 402 plants)
Total U.S. Threatened 198 (112 animals, 86 plants)
Total U.S. Listed 919 (431 animals, 488 plants)

* Separate populations of a species that are listed both as Endangered and Threatened are tallied twice. Those species are the leopard, gray wolf, grizzly bear, bald eagle, piping plover, roseate tern, chimpanzee, Nile crocodile, green sea turtle, and olive ridley sea turtle. For the purposes of the Endangered Species Act, the term "species" can mean a species, subspecies, or distinct vertebrate population. Several entries also represent entire genera or even families.

** There are 416 approved recovery plans. Some recovery plans cover more than one species, and a few species have separate plans covering different parts of their ranges. Recovery plans are drawn up only for listed species that occur in the United States.

Number of CITIES Party Nations: 124

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